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AUTHOR Hart, William K.
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ABSTRACT

This study determines whether a simulation game affects attitudes, and increases motivation and cognitive learning. Seventy-six college students in four sections of a political science course were the subjects. Random selection placed them in two treatment groups and two control groups. Both groups received the game, and one treatment group and one control group received a presemantic differential. It was concluded that among the effects of simulation games, only the differences in the direction of polarization of attitudes were significant. Also the game and the semantic differential complement each other so that the semantic may be used prior to a simulation experience in order to assist subjects in defining their attitudes concerning concepts presented in the simulation. It is suggested that future studies investigate: (1) the finding that simulation games do not affect the degree of polarization of attitudes; (2) the higher attrition rate among minority groups; (3) means to measure the degree of motivation resulting from participation in simulation; and (4) the concepts of polarization of attitudes in the television and movie industries, publications, and advertising. (Author/EK)

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AN ANALYSIS OF THE USEFULNESS OF SIMULATION GAMES IN AFFECTING ATTITUDINAL CHANGES AND SKILL-TYPE LEARNING

April 1970

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

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William K. Hart

United States International University

San Diego, California

April 1970

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SUMMARY

AN ANALYSIS OF THE USEFULNESS OF SIMULATION GAMES IN AFFECTING ATTITUDINAL CHANGES AND SKILL-TYPE LEARNING

by

William K. Hart

Scope of the Study

The study evaluated the effects of a simulation game on attitudinal changes, motivation, and cognitive learning in four political science sections at San Diego Mesa College during the Fall Semester, 1968. The study was an attempt to determine whether or not a simulation game significantly affected attitudes and increased motivation and cognitive learning.

Procedures

Four sections of a political science course were used. Random selection was used to determine two treatment and two control groups. Both treatment groups received the simulation game, and one treatment group and one control group received a pre-semantic differential. All four groups received a post-semantic differential.

There were 150 students enrolled in the four sections. Attrition reduced the effective study sample to 76. Sex,

ethnic, and college division subgroups were formed from the sample.

Tests for significant differences between groups were made and included adjustments for small samples.

Conclusions

There were statistically significant differences in the direction of polarization of attitudes between groups exposed to a simulation experience and groups which were not. There were also statistically significant differences between groups (both treatment and control) which were given the pre-semantic differential prior to the simulation game and those which were not. There were no statistically significant differences between groups with regard to degree of polarization of attitudes, implied motivation, increased cognitive material, sex, ethnic group, or college division.

Discussion and Recommendations

In this study, it was found that in the effects of simulation games only differences in the direction of polarization of attitudes were statistically significant; however, differences in degree of polarization were not. A question could be raised about the validity of the latter finding due to the high rate of attrition in the four political science sections.

An important finding which was not expected in this study was that the treatment and control groups which were

given the pre-semantic differential test consistently produced more positive responses in polarization of attitudes. Therefore, it may be concluded that the semantic differential and simulation game complement each other in that a semantic differential may be used prior to a simulation experience in order to assist sample subjects in defining and stating their attitudes concerning concepts presented in the simulation.

Future studies should investigate more closely the finding that simulation games do not affect the degree of polarization of attitudes.

Studies should also be conducted to investigate the possibility of a higher attrition rate among minority ethnic groups. In such a study, the semantic differential could be very effectively used to test for differences in attitudes between white Caucasian and minority ethnic groups.

It is further recommended that more comprehensive and supportive means be developed to measure the possible degree of motivation resulting from participation in a simulation experience.

The final suggestion for further study is that the concepts of polarization of attitudes be extended to include the movie and television industries, publications, and advertising.

CHAPTER I

INTRODUCTION

One of the new teaching techniques which has developed during the last several years is the simulation game which is used in both education and industry to teach factual and conceptual knowledge, as well as skills. It is on the assumption that simulation games are now validly added to the ever-extending list of instructional aids and tools that this study was based.

Purpose of the Study

The primary purpose of this study was to analyze a plan for the evaluation of changes which may be attributed to participation in a simulation game--such game or games being used as a teaching technique.

More specifically, the study was designed to investigate and measure three aspects of education which cut across three main areas and interests of education. The first aspect was concerned with stated attitudes and the differences in understanding the meanings of various concepts which exist among students. When an instructor speaks of "decision-making" or "the democratic process," for instance, what meanings do students give to these terms? Since any

experience does produce change, does simulation, in fact, augment, or polarize stated attitudes to a greater extent than, let us say, lectures, or class discussions, for instance?

The second aspect of the purpose dealt with motivation. Is it possible that simulation games will increase motivation in social science or a related discipline? Could it be that motivation remains unchanged, or is even decreased? Will simulation engender interest in satellite areas of a specific discipline, such as party history, re-elections, etc.?

The third aspect of the purpose to be considered involved the learning of cognitive material. Is it possible to attribute to the use of simulation games any great significance in the improvement of learning cognitive material?

The fourteen concepts used in the semantic differential and the testing for cognitive material acquired will be discussed in more detail in Chapter III.

Rationale of the Study

The purpose of this study was to analyze a plan for the evaluation of changes which might have been contributed to participation in a simulation game as a teaching technique; specifically, the study was designed to investigate and measure significant changes in:

1. attitudes,
2. motivation,
3. the learning of course material in Political Science 10,
4. increased participation and/or interest in governmental functions based on the recent political campaign and the November 5, 1968, elections

which might have been attributed to the playing of NAPOLI.

In the course of this study, there were four hypotheses to be tested.

Null Hypothesis 1a: There will be no statistically significant difference between the treatment and control groups in the degree of polarization of attitudes as indicated on the semantic differential questionnaire.

Null Hypothesis 1b: There will be no statistically significant difference between treatment and control groups in degree of implied motivation as indicated by scores on the delayed post-test (final examination).

Null Hypothesis 2: There will be no statistically significant difference between treatment and control groups

scores on post-tests of cognitive skills.

Null Hypothesis 3: There will be no statistically significant post-differences between treatment and control groups in amount of indicated time spent in activities covered in the attached questionnaire.

Together with the above-mentioned analyses regarding stated attitudes and cognitive material, further analysis included indications in differences between groups defined by sex, stated college division, and race or ethnic classification.

CHAPTER II

REVIEW OF THE LITERATURE

Current Investigations

According to the 1968 edition of the Subject Guide of Books in Print, there are only about fifty books currently in print in the United States concerning simulation games. In addition, there are comparatively few articles on the same subject in professional periodicals; however, indications are that, within the next few years, the volume of material concerning simulation will increase considerably. According to the Western Behavioral Sciences Institute, La Jolla, California, which has become a major clearing house for information on simulation, it is predicted that interest, research, and experimentation in this area will increase considerably. Information is distributed quarterly through their publication, "Occasional Newsletter about Uses of Simulations and Games for Education and Training."

At the present time, there are three main branches of research in simulation: teaching and training, policy guidance, and research and theory building. Currently, they seem to be running rather closely parallel to each other; however, indications point to the fact that, in the very

near future, these three different areas will become entities in their own rights, since simulation is infinitely expandable and fits together very well with systems analysis.

Teaching and training

Up until this point in time, at least, simulation is more extensively used for teaching and training, institutional structure, concepts, theory, policy guidance, research, and theory building. However, policy guidance and research and theory building are beginning to develop, in their own rights, into entities of their own. (Dill, Jackson, and Sweeney, 1961; Greenlaw et al., 1962)

Opponents of simulation often produce arguments that properties of actual situations cannot be adequately reproduced and that participants in a simulation never really escape the realization that "it does not really count."

Before accepting these arguments at face value, it is worthwhile to make several points. First of all, there is ample evidence that participants in a simulation take the game very seriously indeed, whether they be junior high school students or mature adults. (Guetzkow, et al., 1963, p. 13)

Second, the form and purpose of a simulation must be kept in mind. For example, it is noteworthy as to the purpose and scope of a game whether a game is played by top

management executives on the one hand or high school seniors on the other. Also, there is some evidence that altering the size of the rewards does not significantly change the behavior of the participants. In addition, it is interesting to note that research reveals acute stress when war is imminent or actually occurs in simulation of international relations. (Driver, 1962, p. 132)

Third, for some time, a connection between hypnosis and role-playing has been noted to the extent that throwing one's self into a role can produce a psychic condition similar to a trance. Therefore, it does not seem at all unreasonable that participants in simulation games be tested for susceptibility to the role demands of the game. (Guetzkow, et al., 1963, p. 13)

And finally, it is suggested that responsible decision-makers experience their own actions (either in anticipation or post hoc) in the same way that participants in a simulation game must experience their decisions in order for them to be useful and legitimate. Answers are not self evident in the area of experiencing one's own actions, and judgment should be reserved until a more adequate empirical basis has been established.

Generally speaking, for the purposes of training and teaching, simulation games are used in which human decision-makers are used who act, interact, and react within the framework of a given, simulated system. (Chapmen, et al.,

1962, pp. 172-188; Guetzkow, 1962, pp. 82-92; and Cohen, et al., 1962, pp. 104-123) "Machine-man simulation" and "gaming" both fall into this category of simulation games. Both man-machine simulations and games depend upon human beings (who, by the way, participate within the system as decision-makers, not as experimenters) and computing machines (if they are called for) to simulate a social or psychological system or institution. This type of simulation may be used to train the participants in managerial positions, to teach the basic operations of a social or political institution, or (in research) to aid the behavioral scientist to investigate behavior by manipulating the input in a simulated system. The AMA Top Management Game (Ricciardi, et al., 1958) is a prime example of a man-machine simulation which was developed to help train executives in decision-making. The Northwestern Internation Simulation (Guetzkow, 1962, pp. 82-92) and the Carnegie Tech Management Game (Cohen, et al., 1962 pp. 102-123) are designed to teach students about inter-nation and business relations and to investigate various hypotheses concerning these systems.

Policy Guidance

A common regret of many people in responsible positions is that action appears to be the enemy of thought. Closely coupled with this notion is the false polarity concerning theory on one hand and policy on the other. It

comes as no surprise, therefore, that this distinction is manifested within the area of simulation games. Games which are concerned primarily with policy seem to fall, for the most part, in the category of diplomatic and international situations.

Many of the theoretical challenges which face scholars who are concerned with the development of simulation games appear to have two things in common: (1) a lack of relevant past experience which can be codified and (2) the application and exploration of theories and techniques which are not extensively applied or explored, even though the policy problems are "applied" in the usual sense. Simulation, therefore, appears to be useful for both pure and applied problems. Whether or not the same simulation can serve both needs must be decided on the basis of the individual case and need. (Snyder, 1962 b, pp. 102-171)

Simulation may also be a useful tool for clarifying and stabilizing the interrelations of knowledge and action. Boguslaw (1961, pp. 212-219) proposes a distinction between "established" and "emergent" situations, the former being amenable to the application of previous learning situations and the latter much less so, if at all. The theorizing of behavioral scientists generally deals with established situations. On the other hand, however, policy-makers often perceive themselves to be caught in emerging situations in which they are dealing with unidentified parameters,

unpredictable systems, and a lack of analytic solutions. Nevertheless, it can be tentatively stated that, in the future, emergent situations, through simulations, can be brought under intellectual control by a more sophisticated methodology; and an ability of handling emergent situations can be more effectively learned by policy makers. (Snyder, 1962 a, pp. 94-123)

Simulation is capable of permitting the repetition of parameters and systems and the calculated altering of combinations of these factors. It is also capable of going back to prior situations and playing out alternatives which are available but not often chosen by participants. Through simulation, it is also possible to alter conditions of previous emergent situations in order to help discover what might have changed decisions. Repeated trials can reveal a pattern of consequences of various alternatives to facilitate the construction of a more objective basis for the acceptance of analytic tools to replace participants' intuitive judgments. (Snyder, 1963, pp. 16-18)

Research and Theory-Building

There exists today an unfortunate gap between those engaged in teaching knowledge and/or skills and those concerned with research and theory-building: i.e., university and college faculties, schools of education faculties, and psychologists who are learning specialists. The consequences

of this separation are becoming increasingly recognized, and simulation may well help toward collaboration among the three groups. Teaching and research simulation games ought to feed each other. (Snyder, 1963, p. 14)

For research purposes, simulation is likely to be helpful when the system cannot be dealt with experimentally. NAPOLI, obviously, is of this kind. We may speak of "experimenting" with simulation games; but, strictly speaking, once human beings are used, the basic requirement of what most people understand to be a "true experiment" is ruled out. (Boguslaw, 1961, p. 27) By definition, in an experiment, two situations are created which are identical in all respects except one. (Scott et al., 1966, p. 171) The difference is then described in terms of the single element. Therefore, it is sometimes considered that as long as human beings are used, a "true experiment" is all but impossible. However, since a simulation with any number of uncontrolled elements (human beings) cannot be repeated under laboratory conditions, researchers should not often expect to be able to draw hard and fast conclusions, but rather, trends and directions. (Bloomfield and Padeford, 1959, p. 1197)

Simulation games should be thought of in terms of theory-building in the social sciences rather than as a laboratory experiment. (Luce and Fiaffa, 1957, p. 108) A simulation is a model of a real situation and is only one of the agents of theory-building which a researcher may choose.

Other agents are computer models, mathematical models, written descriptions, and pictorial models. Simulation differs from some of these other agents in that hypotheses may be built into working models. The value of a good working model should never be minimized, for it can have a revolutionary effect. For example, the study of macro-economics did not exist before the Keynesian model was made available. (Allen, 1967, p. 8-42)

Researchers in the field of simulation have made a distinction between congruence on one hand and abstraction on the other. Both of these terms refer to a relationship between the model and the real system. Congruence, or isomorphism, expressed as a matter of degree, measures how closely the simulation resembles the system. A simulation is not totally isomorphic unless the system is reproduced in its entirety.

In other words, congruence is concerned with accuracy, abstraction with detail; and there is no correlation between the two. A simulation can have a high or low degree of congruence and, independently, a high or low degree of abstraction. The significance of a low level of congruence is dependent upon the purpose of the simulation. In research, a rather high degree is required; but for teaching purposes, a game may be entirely playable and have a low degree of congruence. (Scott et al., 1966, pp. 172-173)

The impetus behind simulation games for research

purposes is primarily from Harold Guetzkow and his colleagues and students at the Center for Advanced Study in the Behavioral Sciences and the Program of Graduate Training and Research in International Relations at Northwestern University in the latter part of the sixth decade of this century. (Guetzkow, 1962, pp. 82-92)

Guetzkow's work in the field of the social psychology of groups (Guetzkow and Bowes, 1957, Vol. 3, pp. 380-402) is a happy marriage with the intellectual simulation of war games and social psychology group experiments at Northwestern University to bring about the beginnings of simulation for research purposes. (Guetzkow, 1959, pp. 183-191) In addition, the work of Simon and Snyder in the development and study of both public and private decision-making is another source upon which to draw in using simulation games for research purposes. (Simon, Smithburg and Thompson, 1950, pp. 23-89; March and Simon, with Guetzkow, 1958, pp. 271-300; Snyder, Bruch and Sapin, 1954, pp. 8-14; Snyder, 1958, pp. 3-38)

In using simulation for research purposes, Scott and his associates at the University of North Carolina (Scott et al., 1966, pp. v-vii) began their work with an internation simulation. This game led them to decide that it is possible to simulate developing nations (Chile and Brazil). Finally, they developed a simulation of a United States political system--namely, Durham, N.C. Therefore, if one

nation or city can be simulated, so can another. Their research does at least indicate that simulation has very broad applications to all social systems, institutions, and situations.

One of the real problems with simulation for research is that if a simulation of a field situation is to be realistic, it must needs reproduce with a rather high degree of fidelity the complex nature of the situation. When the complexity is built into the game, there are so many variables that it is difficult to have tight control over them. This is a far cry from a laboratory experiment in which all but one or two variables are controlled. (Pool & Abelson, 1962, p. 87)

Another disadvantage of simulation in research has to do with its affinity with role-playing. In role-playing, a participant is placed in a static situation and is expected to develop within the fabric of a single response to a stated situation. (Biddle & Thomas, 1966, pp. 16-31) In field situations, the participant is placed in a situation which is constantly in a state of flux. Therefore, he must adapt himself, his thoughts, and his responses to a constantly changing stage of events and conditions. For purposes of research, the critical area lies in the calibre of role-playing. (Biddle & Thomas, 1966, p. 17) For example, participants are placed together; and, almost as soon as communication begins, they begin to respond as a group to

the situation. A mood may very well sweep over the group which may not have been anticipated and certainly can never be replicated in successive runs of the simulation.

In addition to this, distortion can be introduced by the nature of simulation itself. Participation may be altered because the participants know that what they are doing is playing a game. This attitude can induce them to be more competitive or less conservative than they might be in reality. (Dresher, 1961, p. 87)

A third area of difficulty in research simulations has to do with the theoretical, and often implicit, assumptions of necessity built into the game. A designer makes an assumption when he incorporates one feature and fails to incorporate another.

> One of the best ways to avoid error in the design of a simulate, or to discover error once it has crept in, is for the designers to be highly self-conscious about the assumptions that are made. To as great extent as possible, assumptions should be made explicit; error is far harder to find when it rests on an implicit assumption. (Scott, et al., 1966, p. 166)

The final task in research, of course, is the analysis of the results; and the capacity to analyze at the present time is not great. Competent people from many research disciplines should help analyze research data, and they should be able to employ a variety of devices: such as communications theory, personality development theory, social development theory, organizational theory, small group analysis, etc.

Simulation for purposes of research is likely to be useful in the study and analysis of a system or situation in which a fairly large number of elements are present and interacting with each other in complex relationships. Other research techniques allow the handling of a large number of variables in simple relationship or a small number of variables in complex relationship. Simulation, on the other hand, has the capacity of handling a large number of variables in complex relationship. (Dresher, 1961, p. 32) One can conclude from this that analysis of systems as complex as whole societies can now be done.

Another advantage of simulation as a research tool is that it combines the advantages of the comparative and holistic approaches to the study of complex social systems. In using the comparative approach, behavioral scientists bring their attention and analysis to bear on isolated variables, often at a cost being made upon synthesis in which systems are observed as a whole. Through simulation, therefore, it is possible to validate analysis of variables within the context in which they lie. (RAND Report P-1540-RC, 1958, p. 8)

Simulation also has the advantages of the case study approach since the design and playing of a game is, for all practical purposes, a case study. (Snyder, 1962, p. 100)

Summary

In this chapter, types, techniques, uses, and purposes of simulation games have been discussed. Simulation is like other tools of teaching, policy guidance, and research. It certainly is not the "alpha and the omega," and it must be evaluated against other techniques along the criteria of applicability, cost, and simplicity and communicability.

Certainly one of the primary advantages of simulation games is that they allow the experimenter to study processes by making any number of runs and by modifying parameters to observe output changes. By studying models with a wide variety of components, variables, and interrelationships, one is placed in the position of being able to study and to evaluate results from a multitude of conditions and relationships. Conway, Johnson, and Maxwell state this rather succinctly:

> Simulation is often described as a means of incorporating a fourth dimension--time--in what have previously of necessity been static methods of analysis. (1959, p. 95)

Another advantage of the simulation process is that one may expand or contract absolute time. This is particularly advantageous for the researcher. For the teacher, in many situations, it is advantageous for the simulation to follow ordinary clock time. (Dawson, 1962, p. 11)

Simulated systems allow the study of areas that

ordinarily would be impractical or impossible under ordinary circumstances. Through simulation, one may, for example, study an inter-nation system with the ramifications of decision-makers, organizations, capacities, tensions, nuclear potential, etc. When various aspects of such a system are simulated by physical analogs, mathematical formulae and/or human beings, variables can be manipulated and characteristics of the real system inferred. The obvious feature here is that, more often than not, it is not possible to experiment with real people and real systems. Helmer and Rescher refer to experimentation of simulations as "pseudo-experimentation," and they go on to say that

> generally it may be said that in many cases judicious pseudo experimentation may effectively amend the oft-regretted infeasibility of carrying out experiments proper in the social sciences by providing an acceptable substitute which, moreover, has been tried and proved in the applied physical sciences. (1959, p. 49)

One great joy of simulation games is that it is not a requirement that they be laden with complex mathematical formulae and processes. This fact has the two-fold advantage of making many games comprehensible to those who do not have a wide background in the particular discipline of mathematics and also of being able to study situations where mathematical methods capable of analyzing all desired variables are not available.

It does seem necessary to say at this juncture that simulation does have the disadvantage of inadequate repro-

duction of a real system. One must, therefore, have reliable mathematical, physical, or human means of reproducing the system; for if the replication and the operation are not valid, the simulation process becomes dysfunctional.

Simulation is a useful technique provided the researcher knows enough about the real system to reproduce it and operate the simulation adequately. Also, one must be careful to select the type of simulation best suited to the process: machine, man-machine, physical analog, Monte Carlo, etc.

Even though simulation is a recent addition to the tools of research and teaching, particularly in organizational, psychological, and social processes, the increasingly frequent use of the term in behavorial science literature indicates the growing acceptance of the process as a whole and the increase of simulation in the future.

> As the proficiency and availability of electronic computers increase, as more empirical data become available to the social scientist, as mathematical and socio-psychological techniques are improved and as the study of human systems and processes continue, it seems reasonable to assume that the popularity and usefulness of simulation will increase. (Dawson, 1962, p. 15)

CHAPTER III

METHODS AND PROCEDURES

Population Setting

The study was conducted at San Diego Mesa College, a public two-year junior college, located in the City of San Diego, San Diego County, California. The college is one of three junior colleges which is a part of the San Diego Unified School District, a K-14 district. The total active enrollment for the School District, as of October 11, 1968, was 168,421. The total active junior college enrollment, as of the same date, was 18,945. (Federal Survey--State Report No. 4, 1968-69, p. 6) Enrollment at San Diego Mesa College on October 16, 1968, was 6,213. (San Diego Community Services, Pupil Ethnic Census Report, 1968-1969, 10/16/68, p. 25)

The population from which the study sample was selected consisted of all students enrolled in San Diego Mesa College during the 1968 Fall Semester.

The 1968 Fall Semester population is described below. Table 1 indicates the aptitude levels of the entering students for the 1968 Fall Semester at San Diego Mesa College, as indicated by standard scores on the American College Tests.

TABLE 1

MEAN SCORES AND PERCENTILES OF 1968 FALL SEMESTER FIRST-TIME ENTERING STUDENTS

	English	Math	Soc. Sci.	Nat. Sci.	Composite
Mean Scores	15.8	14.8	18.6	18.2	16.9
Percentiles	36	33	44	45	38

(*Based on "West Coast Region, Level I;" College Student Profiles; p. 98)

The ratio of males to females was approximately two to one. The ethnic or racial distribution of San Diego Mesa College students during the Fall of 1968 was (1) Spanish Surname: 227 (3.7%); (2) Other Caucasian: 5,799 (93.3%); (3) Negro: 142 (2.3%); and (4) Other: 45 (0.7%). (San Diego Community Services, Pupil Ethnic Census Report, 1968-1969, 10/16/68, p. 25)

Study Sample

Four classes of Political Science 10 at San Diego Mesa College were assigned by the instructor for use in the study. There were 150 students enrolled in these four classes. The effective study sample was reduced to 76 students through attrition. The sample was divided as follows: (1) arts and science programs, 49; (2) business programs, 6; and (3) technical programs, 21.

Of the 76 students in the study sample, there were 56 males and 21 females. In the sample, there were 44 first-time students, and 14 were on probation. The mean age was 21 years of age, with a range of 18 - 49. One had not completed high school; and the mean composite American College Test score, for the 52 students out of the sample of 76 who took the test, was 16. The ethnic or racial background of the sample was as follows: (1) Spanish surname, 5; (2) Other Caucasian, 63; (3) Negro, 7; and (4) Other, 1.

Instrumentation

There were five different types of instruments used in this study. One, used to compare the meaning of concepts, was the semantic differential. Another was a questionnaire used to determine the amount of time in which the student was involved with the November 5, 1968, general elections. The third type of test was the qualifying exams, required by the State of California, on California and local governments and the U.S. Constitution. The fourth category was a test, standardized by national norms, referred to as "Econ A." And finally, there were two midterm examinations based on the cognitive course material.

The Semantic Differential

The semantic differential is a generalized method of measuring the meaning of a concept; this method was originated, divised, and developed by Osgood, Suci and Tannenbaum. (1957) The semantic differential has the advantage of being adaptable to the individual situation based on the desires of the researcher, since it is a general, rather than a specific, method of investigation. In the following sections, a description of the semantic differential will be presented, including its validity, reliability, and limitations. The instrument, based on the semantic differential concept, will then be described as it was used in the study, along with the method of scoring.

Rationale and General Description. In any discussion of the semantic differential, it is necessary to understand two assumptions concerning this instrument, the rationale for which is given by Osgood, Suci, and Tannenbaum. (1957) The first assumption is that the meaning of practically all concepts can be divided into at least three dimensions which are, for all practical purposes, mutually independent of each other. These are referred to by Osgood, Suci, and Tannenbaum as evaluation, potency, and activity. In addition, each one of these dimensions can be further defined by a series of bi-polar scales which are represented by a

pair of opposite adjectives.

In other words, evaluation can be defined by such scales as important--unimportant, beautiful--ugly, or other pairs of adjectives which represent the value or an appraisal of the concept under consideration. Potency employs such adjectives as positive--negative, hard--soft or other pairs which refer to the strength of a given concept. Activity may use such pairs of adjectives as active--passive, dead--alive, or others which describe the operation or function of a specific concept. Obviously, these examples are very limited due to the fact that each dimension has an infinite number of scales depending, of course, on what the researcher wishes to study. The adaptability and elasticity of this instrument is the primary reason that the semantic differential is considered to be a general rather than a specific instrument.

When one studies these three dimensions, it becomes apparent that they are mutually independent. For example, a kitten could be described as beautiful, soft, and active; whereas Michelangelo's "David" might be referred to as beautiful, hard, and passive. Nazi Germany could be described as ugly, negative, and active; whereas a penicillin culture might be referred to as ugly, positive, and active. Therefore, these three dimensions (evaluations, potency, and activity) are separate and independent of each other.

The second assumption upon which this description is based is that these three dimensions can be plotted on three mutually perpendicular axes which define "semantic space"--not dissimilar from three-dimensional Euclidian space. Simply by using Euclid's model and these three semantic dimensions, any concept can be plotted in semantic space by knowing where the concept falls along each of the three perpendicular axes. In other words, the three semantic dimensions (evaluation, potency, and activity) correspond to the Euclidian dimensions of x, y, and z. In order, then, to locate a point in three dimensional space, it is necessary to travel the correct distance in the direction parallel to each of the three respective dimensions to arrive at the proper location in space. Therefore, in order to locate a concept in semantic space, it is necessary to know how the concept is conceived in terms of the three dimensions--evaluation, potency, and activity. To be more specific, the degree of each semantic dimension must be known. The purpose of this discussion is for us to move now to see by what method one knows how far along each dimension he must needs move in order to locate a particular concept in semantic space.

The semantic differential is designed to measure quantitatively the three dimensions of a concept as perceived by an individual. As a person responds to the semantic differential, he indicates his judgments of a specific

concept in terms of the three dimensions. The results not only indicate polarity, but they also show degrees of polarity.

In order to be able to employ the Euclidian model of space, it is practically imperative that the degree of each dimension be expressed in numerical terms. The semantic differential is designed in order that the results are easily stated, read, and plotted in numerical terms. Each possible position on the scale is assigned a "score", usually from one to seven. A typical scale appears on the instrument thus:

Interesting___ : ___ : ___ : ___ : ___ : ___ Uninteresting

If the righthand space were assigned a score of one and the lefthand space a score of seven, these scores would then correspond to locations along the evaluative dimension of semantic space. A score of four would indicate that the concept is seen by an individual in a neutral position.

In practicality, an individual responds to a scale on the basis of verbal modifiers associated with each point on the scale. In the above example, the respondent could indicate that he saw a specific concept as: (1) very interesting, (2) quite interesting, (3) slightly interesting, (4) neither interesting or uninteresting, (5) slightly uninteresting, (6) quite uninteresting, or (7) very interesting. Osgood and his associates (1957, p. 327) indicated

that the above terms represent more or less equal degrees of intensity between zero and the extreme. "We have fairly satisfying evidence that our seven-step scales, defined by the linguistic quantifiers 'extremely,' 'quite,' and 'slightly,' in both directions from a neutral 'meaningless' origin, do yield nearly equal psychological units in the process of judgments." (p. 327) Osgood et al. used the terms "extremely" and "very" interchangeably. Messick (1957, p. 202), using the psychometric method of successive intervals, also concluded that the seven-step scaling process with the above terms is valid.

When the rating of a concept along the three dimensions is known in numerical terms, the result is a point in semantic space which can be plotted along the axes of the three dimensions, which is the same process as plotting geometrically a point in Euclidian space, given the three co-ordinates of the point. The genesis of semantic space, where the three axes intersect, can be considered as the point of "meaninglessness." Traveling away from the origin along one of the axes indicates the concept has meaning corresponding to the direction of the motion. The distance traveled indicates the degree of meaning in that particular direction.

It follows, then that the meaning which an individual gives to a specific concept may be plotted at an exact

point in semantic space. Therefore, the meanings given by five or a dozen individuals will result in either five or a dozen exact points in space. The meaning given by several hundred people, on the other hand, will result in a "cloud" of points, the center of which represents the average meaning of the group.

If it becomes desirable to compare the meanings given by two individuals to the same concept, it is necessary only to measure the distance between the two points in space which represent each individual's location. Therefore, the meaning given by two groups of people may be measured in the same manner--in other words, by measuring the distance between the two clouds. Therefore, meanings can be measured and compared which an individual or a group gives to two or more concepts.

Not only can meanings be compared between individuals or between groups, but also the change in meaning that may take place in an individual or a group may be taken into consideration. That is, an individual or a group reacts to a specific concept by means of the semantic differential before and after an experimental process in pre- and post-treatment tests. Any change of stated attitudes which results in a change of location in semantic space with respect to pre- and post-tests may, therefore, be due to the experimental process. In other words, both the direction and

amount of change can be noted. For example, as a result of certain classroom experimental procedures, a student may come to have a much better understanding and appreciation of the problems and difficulties of management. His reaction to the concept "management" would, therefore, indicate a movement along the dimension of positive evaluation.

In this study, changes in meaning were measured between treatment and control groups in pre- and post-tests, using among other instruments, the semantic differential. The differences between the meanings assigned by the treatment and control groups were indicated by the distances separating the cloud locations in semantic space of the various groups.

Validity. Generally speaking, the validity of an instrument is established by correlating it with another instrument which measures the same thing. It is impossible to establish the validity of the semantic differential in the same manner due to the fact that no other instrument exists for measuring meaning in the same way in which the semantic differential does. Osgood et al., therefore, looked at the problem from the standpoint of "face" validity. They cited examples to establish how self-evident the validity is in most cases:

> Throughout our work with the semantic differential, we have found no reasons to question the validity of the instrument on the basis of its correspondence with results to be expected from common sense. (1957, p. 141)

The evaluative scale is frequently employed by itself to measure stated attitudes; and it can, therefore, be correlated with other attitudinal scales. The evaluative scale only was used in this study. Brinton (1961) used this technique in measuring validity of the semantic differential and reported his findings: "Validity of the differential attitude scales appears to be high, based on high correlations with scores gathered by the traditional Thurstone, Likert, and Guttman types of scales." (p. 289)

Reliability. The reliability of the location of a point in semantic space is a function of the reliability of each of the three coordinates which determine the point. The reliability of the semantic differential, therefore, is dependent upon the reliability of each of the dimension (evaluation, potency, and activity) scores. In practice, however, each dimension score is the average of several scale scores, each of which represents the same dimension. In other words, the evaluative dimension or factor score should be the means of two or more, such as hard--soft, good--bad, light--heavy. By using two or more scales, the reliability of the total factor greatly increases, as opposed to using only one scale along. There were four scales used for each item in the semantic differential in this study.

> The reliability of the data generated by the semantic differential is higher when ratings from two scales are combined to obtain factor scores than when only single scales are used. (DiVesta and Dick, 1966, p. 613)

As far as the reliability of the semantic differential, using average factor scales, is concerned, Osgood, Suci, and Tannenbaum (1957) stated concerning test--re-test data: "We find that a change in factor score of more than 1.00 for the evaluative factor, more than 1.50 for the potency factor, and more than 1.33 for the activity factor is significant at about the 5 per cent level." (p. 139) The numbers represent steps in the seven-point scale described above. For example, moving one space either right or left along the seven-point scale represents a change in score of 1.00; moving two points represents a change of 2.00.

What has been said so far pertains to individuals. For groups, Osgood et al. found that a change of 0.40 represents a significant change in factor scores. (1957, p. 140) Research by the authors indicates that item reliability, correlated across 100 subjects and 40 items, produces an N of 4,000 with a resulting coefficient of .85.

It is interesting to note that there seems to be little difference in the test--re-test reliability between adults and children. DiVesta and Dick (1966) found that the semantic differential is a proper technique when used with children as young as the third grade, or eight years old. The versatility of the semantic differential is then

extended, since it is an appropriate instrument in comparing groups of all ages.

Limitations of the Instrument. Three limitations should be taken into consideration with regard to the use of the semantic differential as it was employed in this study. The first limitation was concerned with the social desirability of certain responses. This limitation was especially true since the instrument employed in the study, based on the semantic differential, used only the evaluative factor in conjunction with academic and political concepts. Especially since the identity of the subjects was known, it was certainly possible that many of them hesitated to indicate their true attitudes about certain concepts. A student enrolled in Political Science 10 might very well have been reluctant to state that the concept "Political Science" was uninteresting, unimportant, and unnecessary. By the same token, an identified registered voter might not wish to state that the Congress is an unnecessary and negative body, simply because this is not a socially desirable response.

The second limitation was one that Osgood calls "concept-scale interaction." There is some evidence that some scales interact with some concepts which produces spurious results. An example of this is the "interesting--uninteresting" scale as it is applied to the concept

"Political Speeches." In one sense, "Political Speeches" may be interesting from the standpoint of political platform and positional statements. On the other hand, they may very well be considered uninteresting in view of the fact that, on occasions, time is spent with little actual information being given, especially when vitriol is employed. Therefore, a subject responding to the concept "Political Speeches" may possibly have had difficulty deciding whether it was interesting or uninteresting. Consequently, if this be true, the results are difficult to interpret.

In actual practice, it is all but impossible to eliminate each and every case of concept-scale interaction. One indication of this interaction is having two scales representing the same factor correlate highly, and a third appreciably different. In this case, one may very well suspect that the scale which does not have a high correlation has interacted with the concept to produce deceptive results. The omnipresent possibility of concept-scale interaction is an excellent reason for using three or more scales for one factor and averaging the results.

The third and final limitation had to do with the discrimination ability of the semantic differential. As the distance between points in semantic space increases, the certainty of difference between individuals or groups

increases. Conversely, as the distance decreases, the certainty of difference also decreases. Therefore, if two points in space are close to each other, it may be difficult to tell if they actually represent different meanings.

The Semantic Differential as Used in this Study. Osgood, Suci, and Tannenbaum state these criteria as a basis for selecting concepts to be used in a semantic differential instrument. The first criterion is that a concept must have only one meaning for the person responding; and finally, the concept should have different meanings among the subjects involved. (1957, p. 77) Based upon the framework of NAPOLI, the course requirements of Political Science 10 at Mesa Junior College, and the above stated criteria, fourteen concepts and the order in which they appeared in the instrument were as follows: Political Science, Course Unit, Elected Officials, Republican Party, Democratic Party, Party Loyalty, Decision-Making, Simulation Games, Re-Election, Political Speeches, Responsibility, Election, Congress, and Democratic System.

Each concept was rated against four scales--sets of bi-polar adjectives. An attempt was made to reduce the social desirability factor and the concept-scale interaction as much as possible by eliminating scales which seemed to be detrimental in these respects. Scales were chosen which have high "loadings" in the evaluative factor. The scales used for this factor were: interesting--uninteresting,

important--unimportant, necessary--unecessary, and positive--negative. The loadings referred to above were from the results indicated how heavily loaded each scale was in each of the factors. (1957, p. 55ff)

Subjects were asked to respond to each scale on the basis of a seven-step gradation as previously explained. The subjects were instructed that the center space was a neutral position and that the terms "slight", "quite", and "very" were implied as one moved out from the neutral position toward the extreme of the scale where the adjectives are written. The scales were not reversed; therefore, the low and high ends always appeared in the same position. A copy of the semantic differential may be found in Appendix A, and its position in the study is plotted in the Time-Line, Appendix F.

Scoring. The initial scoring of the semantic differential used in the study was done by hand. The goal of the initial scoring was to find the factor score for each concept for each person. The seven-step scale was scored on the basis of one through seven, from right to left; and averages were calculated to the nearest one-hundredth of one per cent.

It is readily seen that a semantic differential generates vast amounts of data. Each subject, responding to the fourteen concepts, obtained a factor score for each concept, or fourteen factor scores. Each subject in one

treatment and one control group made fifty-six responses on both pre- and post-tests; each subject in the other two groups made fifty-six responses on the post-test only. These responses were punched into cards for processing by an electronic computer for analysis based on BMD: Biomedical Computer Programs. (Dixon, 1967) By use of a computer, mean factor scores and standard deviation scores were obtained for the two control and the two treatment groups (four groups). Analysis of covariance was used to compare the four groups, using as variables the fourteen concepts listed in the semantic differential.

California and Local Government Tests

One of the course requirements in Political Science 10 was a series of tests on American Institutions; namely, the United States Constitution and California and local governments. The Politics and Government in California by Bernard L. Hyink et al. was used during the Fall Semester of 1968 at Mesa College as the text for the study of California and local governments. Each student was expected to study this book and to take a series of three examinations based on the contents of Hyink's work during the course of the semester. The first test was given before NAPOLI, the last two after. The first test was based on the contents of Chapters 1-4, referred to as "Hyink (1-4)" in the Time-Line, Appendix F; the second on Chapters 5-9, "Hyink (5-9)"; and the last, Chapters 10-13, "Hyink (10-13)".

All three of the tests on California and local governments were composed only of multiple choice questions based on cognitive material. The first two contained 125 questions; the third, 105. The scoring was done by the instructor who designed the tests; and for the purposes of analysis the raw scores were punched into the IBM cards for each student.

"Econ A"

"Econ A" is an abbriviation for "Test of Economic Understanding, Form A," published by Science Research Associates in 1963. This one-hour test of fifty items was designed for use in secondary schools and colleges to test economic understanding and knowledge. (Interpretive Manual, p. 1) In developing this test, S.R.A. gave it to 1,230 high school seniors who had completed one semester of economics. Based on the raw score, with 50 items, the mean is 26.28; the standard deviation, 7.74; and reliability coefficient (KR-21), .81. (Interpretive Manual, p. 4)

This test was scored by hand, and for the purposes of analysis, the standard scores were punched into the IBM cards for each student. For the place in the semester of "Econ A", which was used as part of the immediate pre-tests, see the Time-Line, Appendix F.

Midterm I

The first midterm examination became the cognitive

section of the immediate post-test. Midterm I was divided into three parts. All three parts were scored by the instructor; and for the purposes of analysis, the raw scores were punched into the IBM cards for each student. To see the position of this examination within the framework of the semester, see the Time-Line, Appendix F.

The first part of Midterm I was based upon Chapters 9-13 of Government by the People, by J. M. Burns and J. W. Peltason. This unit test was prepared by the authors and contains 130 objective questions of various types (true-false, multiple-choice, and fill-in-the-blanks). It was based solely on the material found in the above-mentioned chapters.

The second part of Midterm I was designed by the instructor and is composed of 100 questions concerning monetary and fiscal policies of the U.S. Government. This test was constructed by the instructor.

The third and final part of Midterm I consisted of twenty-five multiple-choice questions covering the farm problems in the United States. As was the test on monetary and fiscal policies, this test was designed by the instructor. Raw scores were punched into IBM cards for analysis.

Midterm II

The second midterm examination was administered just prior to the Christmas recess in the third week of December. (See the Time-Line, Appendix F)

This examination was constructed by the instructor and was divided into two parts. The first part of Midterm II was based on Chapters 14-18 of Government by the People, J. M. Burns and J. W. Peltason. This section of the examination consisted of eighty true-false questions and twenty multiple-choice questions on the Executive and Legislative Branches of the Federal Government.

The second part of Midterm II contained fifty true-false questions concerning international relations and the current foreign policy of the United States. This part of the examination was based on Burns & Peltason, Government by the People, Chapters 21-23. The raw scores were punched into the IBM cards.

U. S. Constitution

As was stated in the section entitled "California and Local Government Tests," one of the course requirements for Political Science 10 was a test on the contents of the U.S. Constitution. This particular examination was the last one given during the semester and its place within the fabric of the course may be seen in the Time-Line, Appendix F. The instructor designed and scored this test which consisted of seventy-one multiple-choice, nineteen true-false, and ten matching questions. For the purpose of analysis, the raw scores were punched into the IBM cards for each student.

Procedure

During the Spring Quarter of 1968, the author and Dr. Otto A. Heinkel, co-ordinator of research for the San Diego Junior Colleges, were enrolled in Dean Rucker's critique course in curriculum research at United States International University, San Diego, California. Dr. Heinkel stated that his office was interested in conducting a study in simulation games with close investigation into attitudinal changes and cognitive learning.

These conversations eventually led to a meeting at San Diego City College on June 28, 1968, which was attended by the Dean of that College, the Dean of San Diego Mesa College, Dr. Heinkel, faculty from the social sciences departments of those schools, and the investigator. The result of the meeting was that Mr. Gary Monell, chairman of the Social Science Department at San Diego Mesa College, stated that he would allow four of his Political Science 10 classes to be used for the study.

As the discussion of the study progressed, it was decided to use the Solomon Four-Design Paradigm (Gage, 1963, pp. 194-195), and randomization was used for assignment of class sections to treatment and control groups. The Solomon Four-Design Paradigm can be diagramed in the following way:

	Pre-test	Experiment	Post-test
(R)	O	X	O
(R)	O		O
(R)		X	O
(R)			O

Four groups or class sections, two treatment and two control, are required for the Solomon design. Intact classes were randomly assigned to one of these four groups. The effect of the instructor was not considered a factor since NAPOLI did not require leadership or direction from an instructor or anyone else from outside the group. In other words, NAPOLI is a self-contained simulation game; and the direction and leadership emerge from the group itself.

As it turned out, the classes and their uses in the experiment were as follows:

TABLE 2

CLASS ASSIGNMENTS

Section	Day	Time	Assignment*	Pre-Test*
25635	M W F	10 - 10:50	$Treatment_1$	Yes
25639	M W F	1 - 1:20	$Control_1$	Yes
25634	T Th	9 - 9:50	$Treatment_2$	No
25640	T Th	1 - 1:20	$Control_2$	No

*These colums correspond to columns two and three of the Solomon Four-Design Paradigm. See above.

Control Groups

During the time in which NAPOLI was being run in the treatment groups, the two control groups, which were not exposed to NAPOLI, were discussing prior and predicted voting patterns, as well as the three major candidates for President (President Nixon, Mr. Humphrey, and Mr. Wallace) in the General Election on November 5, 1968. These discussions were based primarily on the October 21, 1968, Newsweek and Walter Cronkrite's C.B.S. Report on election probabilities. $Control_1$ did have the pre-tests, $Control_2$ did not.

$Treatment_1$

The $Treatment_1$ Group (hereafter referred to as T_1) ran NAPOLI for four class sessions: October 28, 30,

November 1, and 4 (see the Time-Line Appendix F), and did receive the pre-test. During the first seven minutes of the first session, the game was explained, the Calculator and the Speaker were appointed. The class then divided itself into two parties: American Traditionalist Party (conservative, and hereafter referred to as the ATP) sixteen plus the Speaker; American Modernist Party (liberal, and hereafter referred to as the AMP) thirteen. The leader of the minority party, the AMP, was elected

From 10:07 - 10:22, party caucuses were held, and four bills from each party were presented for passing. At 10:22, regional caucuses were held. At 10:36, the House met and the precedence of bills for the agenda was established as follows: (For a copy of the bills, see Appendix E)

TABLE 3

TREATMENT GROUP$_1$ ACTIONS, SESSION 1

Bill	Party	Votes	Precedence	Action
1	ATP	10	4	Passes 22 - 11
2	AMP	10		
3	Bi-Partisan	4		
4	AMP	17	1	Tabled
5	ATP	9		
6	ATP	8		
7	AMP	16	2	Motion to table defeated; passed, 26 - 7
8	Bi-Partisan	3		
9	AMP	13	3	Defeated, 26 - 7
10	Bi-Partisan	0		
11	ATP	5		

During this session, Bill 4, entitled, "The Federal Government Should Spend $11 Billion To Eliminate Extreme Poverty Through Direct Subsidies To The Poor", seemed to create the most tension in Treatment$_1$.

On October 30, the last three bills from the first session were acted upon (See Table 1) from 10:05 - 10:17. Party caucuses met until 10:27; regional, until 10:37. The House met from 10:36 until the class period ended at 10:50.

During this time, the agenda was again established,

and voting began on the bills. Since Bill 4 was tabled at the first session, it was placed again to be considered in the order of precedence and again received first place.

TABLE 4

TREATMENT GROUP$_1$ ACTIONS, SESSION 2

Bill	Party	Votes	Precedence	Action
2	AMP	15	4	Tied, 14 - 14; defeated 15 - 14
3	Bi-Partisan	21	2	Motion to table defeated; defeated, 16 - 11
4	AMP	22	1	Motion to table defeated; passed, 17 - 14
5	ATP	11		
6	ATP	18	3	Passed, 17 - 11
8	Bi-Partisan	4		
10	Bi-Partisan	3		
11	ATP	2		

On November 1, the last three bills from the second session were acted upon (See Table 2) from 10:00 - 10:16. The House then broke into party caucuses until 10:26 and regional caucuses until 10:32. From then until 10:55, Bills 5, 8, 10, and 11 were accepted in that order as the order for the agenda by a motion from the floor, which was carried.

TABLE 5

TREATMENT GROUP$_1$ ACTIONS, SESSION 3

Bill	Party	Action
5	ATP	Defeated, 17 - 10
8	Bi-Partisan	Motion to table defeated; defeated 14 - 12
10	Bi-Partisan	Defeated, 14 - 12
11	ATP	Defeated, 16 - 13

On November 4, T_1, completed the third session from 10:00 until 10:15. For the next ten minutes, the Calculator's report was presented. There were no re-elections. A summary of the action taken on each bill follows:

TABLE 6

TREATMENT GROUP$_1$, SUMMARY OF ACTIONS ON BILLS

Bill	Party	Action
1	ATP	Passed, 22 - 11
2	AMP	Defeated, 15 - 14
3	Bi-Partisan	Defeated, 16 - 11
4	AMP	Passed, 17 - 14
5	ATP	Defeated, 17 - 10
6	ATP	Passed, 17 - 11
7	AMP	Passed, 26 - 7
8	Bi-Partisan	Defeated, 14 - 12
9	AMP	Defeated, 26 - 7
10	Bi-Partisan	Passed, 14 - 12
11	ATP	Defeated, 16 - 13
TOTAL PASSED	5	
TOTAL DEFEATED	6	

It is the observation of the experimenter that this particular class (T_1) was rather slow in starting; however, the momentum and general interest increased as the sessions progressed; and the speeches, as a whole, gained calibre in both content and manner of presentation.

From 10:25 until the end of the period, a general discussion took place. The fact that the Calculator

reported no re-elections (since the di cast "one") came as a great surprise to the class. This fact led to the criticism that too many people voted along regional, rather than party, lines, which pointed out rather effectively the conflict between regional and party interests. Another criticism which seemed to find favor was that the game itself did not seem realistic enough.

Several other ideas presented were:

1. All the bills were concerned with fiscal matters.
2. The arguments, as a whole, were emotional and not too substantial with very little of the individual speeches based on course material.
3. The game itself presented very well the concept of cross pressures.
4. Longer periods of time would have been better.
5. In all probability, there was no indication from class discussion that any minds were changed with regard to voting due to the speeches made, even though there was an independent group (about 8%) which could be courted by speech makers and swayed by the speeches.
6. There was no evidence of "log-rolling."

Treatment$_2$

. Treatment$_2$ Group (hereafter referred to as T_2), which not was given the pre-test, began in the same way on

October 28. From 9:05 - 9:23, the game was explained and the class read through the NAPOLI Student's Manual. The only question asked was whether or not one may disagree with one's own party. From 9:23 until 9:31, the Speaker and Calculator were appointed. The class then divided into two parties: the AMP (thirteen and the Speaker) and the ATP (nine). The leader of the minority party (ATP) was elected and he was able to exert strong influence on both his party and his regional colleagues. At 9:50, the regional caucuses began; at 10:05, the House met to select the order of precedence of the bills for the agenda.

TABLE 7

TREATMENT GROUP$_2$ ACTIONS, SESSION 1

Bill	Party	Votes	Precedence	Action
1	ATP	9		
2	AMP	5		
3	Bi-Partisan	3		
4	AMP	10	3	Motion to table defeated; passed, 14 - 11
5	ATP	12	2	Motion to table defeated; passed, 14 - 12
6	ATP	10	4	Motion to table defeated; passed, 12 - 11
7	AMP	16	1	Motion to table defeated; passed, 17 - 6
8	Bi-Partisan	9		
9	AMP	9		
10	Bi-Partisan	3		
11	ATP	8		

The second class period began at 9:00 on November 1, and the first twenty-seven minutes were given to finishing the work begun in the first session (see Table 5). Party caucuses lasted from 9:27 - 9:34; and regional caucuses, from 9:34 - 9:45. The House began its second session at 9:46 when the agenda was once more established, and speeches and voting began.

TABLE 8

TREATMENT GROUP$_2$ ACTIONS, SESSION 2

Bill	Party	Votes	Precedence	Action
1	ATP	22	1	Passed, 19 - 7
2	AMP	15	3	Passed, 17 - 6
3	Bi-Partisan	5		
8	Bi-Partisan	13	4	Defeated, 17 - 8
9	AMP	9		
10	Bi-Partisan	3		
11	ATP	16	2	Defeated, 15 - 11

At 10:10, the second House session having been completed, party caucuses met for five minutes. The regional caucuses lasted until 10:20; and at 10:20, the third House session began and the precedence of the three remaining bills was established for the agenda when the class period ended at 10:25.

TABLE 9

TREATMENT GROUP$_2$ ACTIONS, SESSION 3

Bill	Party	Votes	Precedence	Action
3	Bi-Partisian	15	2	Passed, 15 - 12
9	AMP	17	1	Defeated, 17 - 10
10	Bi-Partisan	9	3	Defeated, 18 - 10

The next class period, November 5, began at 9:00 by finishing the third and final session with speeches, discussion, and voting on the remaining bills (see Table 7). The Calculator made his report between 9:30 and 9:40. A roll of "one" on the di defeated everyone for re-election. One student expressed it rather succinctly by stating, "Wiped out in one campaign!"

A review of the action of T_2 on the bills follows:

TABLE 10

TREATMENT GROUP$_2$, SUMMARY OF ACTIONS ON BILLS

Bill	Party	Action
1	ATP	Passed, 19 - 7
2	AMP	Passed, 17 - 6
3	Bi-Partisan	Passed, 15 - 12
4	AMP	Passed, 14 - 11
5	ATP	Defeated, 14 - 12
6	ATP	Passed, 12 - 11
7	AMP	Passed, 17 - 6
8	Bi-Partisan	Defeated, 17 - 8
9	AMP	Defeated, 17 - 10
10	Bi-Partisan	Defeated, 18 - 10
11	ATP	Defeated, 15 - 11
TOTAL PASSED	6	
TOTAL DEFEATED	5	

In the general discussion which followed, the students in T_2 seemed to have a better understanding of cross-pressures than did T_1. For instead of being able to withdraw from a situation, they realized rather well that they were being forced into making a stand in voting with the party and/or the region.

These students commented on the fact that NAPOLI seems to be rigged toward the party and that, generally, one has to vote the party line if he expects to be re-elected. The glaring exception, of course, is the Democratic South.

Some of the students felt that NAPOLI contains few major party bills and that possibly the bills could be updated.

There was a general feeling that at times the game moved too fast, due possibly to the absence of committee and sub-committee work within NAPOLI itself.

As in T_1, very few students argued from the position of monetary and fiscal policy, presented earlier in the course. There was considerable interaction not only during the game but also during the discussion. The last topic discussed, which generated a great deal of interest, was whether or not the game should be more closely tied in with the cognitive material of the course and extended over a longer period of time, possibly even a whole semester. There were

no concrete suggestions given on the mechanics of how this could be accomplished.

Method of Analysis

The primary method of analysis for the study was the Biomedical Computer Programs (Dixon, 1967) BMDOIV, Analysis of Variance for One-Way Design (Dixon, 1967, pp. 486-494), which was designed to compute an analysis-of-variance table for one variable of classification, with unequal group sample sizes. This program was also supplemented by BMDO4V, Analysis of Covariance with Multiple Covariates (Dixon, 1967, pp. 525-542), which was designed to compute analysis-of-covariance information for one analysis-of-variance variable with multiple covariates and unequal treatment group sizes. Resulting F-ratios were interpreted for statistical significance.

Directional differences, indicated by the semantic differential, were analyzed as follows: "Interesting," "Important," "Necessary," and "Positive" (from the left-hand pole of the semantic differential) were defined as desirable, or positive, attitudes. Undesirable, or negative, attitudes were associated with "Uninteresting," "Unimportant," "Unnecessary," and "Negative" (from the right-hand pole of the semantic differential).

Directional differences were analyzed by assigning numeric values to the possible response position as

illustrated below:

Interesting 7 : 6 : 5 : 4 : 3 : 2 : 1 Uninteresting

Ratios were formed using positive and negative responses compared to total responses. Chi square tests for significance of the difference between two independent proportions were applied to each of the fourteen categories and to the total instrument. This statistical method was chosen due to the small sample size resulting from rather high attrition (50 per cent).

Polarity differences were analyzed by assigning numeric values to the possible response positions as illustrated below:

Interesting 3 : 2 : 1 : 0 : 1 : 2 : 3 Uninteresting

Means were computed for each individual item as well as for the total for all fourteen items. Statistical significance for the difference between means was determined by t-tests. Variances in the four groups were considered sufficiently alike to permit use of the t-test.

Summary

The present chapter has dealt with the general methods and procedures which were followed in the study. The college in which the study was conducted and the study sample were described first. Next, the instrument was described which was used to compare the meanings of concepts and the three types of instruments to measure cogn tive course material. Finally, the procedures used with the two control

and the two treatment groups, as well as the general methods of analysis, have been delineated.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF THE DATA

Chapter IV includes a presentation, analysis, and interpretation of the data relative to each of the null hypotheses, as stated in Chapter I, pages three and four.

Null Hypothesis 1a

There will be no statistically significant difference between the treatment and control groups in the degree of polarization of attitudes as indicated on the semantic differential questionnaire.

Findings

The statistical findings for this hypothesis will be presented in two parts. The first part will treat the direction of polarization of attitudes as indicated on the semantic differential; the second part will present the data concerned with the degree of polarization.

Differences in direction of polarity of attitudes were analyzed by assigning numeric values to the possible response positions for each student on each item of the semantic differential as illustrated below:

Interesting 7 : 6 : 5 : 4 : 3 : 2 : 1 Uninteresting

Direction. The Chi square test was chosen to be used in determining the direction of polarization of attitudes for two reasons: 1.) In experimental situations, Chi square serves well in comparing observed frequencies of responses to theoretical frequencies, generated on the basis of the hypothesis and independent of the data at hand. 2.) By using a "2 x 2" table to test significance, Chi square values can be used to calculate exact probabilities, since it can be well employed when the expected cell frequencies (based on the sample size) are small.

Chi square scores were calculated by using for each response the following "2 x 2" table,

"2 x 2 TABLE"

A	B	A + B
C	D	C + D
A+C	B+D	N

in which: A = positive or negative responses in one group being compared;

A+B = total number of responses in first group;

therefore, B = A+B-A;

C = positive or negative responses from the second group being compared;

C+D = total number of responses in second group;

therefore, D = C+D-C;

N = either (A+C)+(B+D) or (A+B)+(C+D)

When the cells were completed for each item on the semantic differential for both positive and negative responses in all six of the group comparisons (180, "2 x 2" tables), then Chi square = $\frac{N(AD-BC)^2}{(A+B)\ (C+D)\ (A+C)\ (B+D)}$. (Ferguson, 1966, p. 204)

Directional differences indicated by the semantic differential were categorized and analyzed as follows: interesting, important, necessary, and positive (listed on the left-hand pole of the semantic differential) were defined as positive attitudes; uninteresting, unimportant, unnecessary, and negative (listed on the right-hand pole of the semantic differential) were defined as negative attitudes. (See Appendix C, page 132) Ratios were generated by using positive and negative responses and comparing them to total responses. Chi square scores were calculated to test for significance of the difference between two independent proportions. Tests for significance were applied to the fourteen categories as well as to the total semantic differential.

Tables 11-16 present the directional scores of positive responses, by comparing all four groups, on the semantic differential. Tables 17-22 present the directional scores of negative responses, by comparing all four groups, on the semantic differential. In these tables,

Category = the items on the semantic differential;

T_1 = treatment group with pre-semantic differential test;

C_1 = control group with pre-semantic differential test;

T_2 = treatment group without pre-semantic differential test;

C_2 = control group without pre-semantic differential test;

Chi Square = the score upon which the probability (p), or the difference between groups, is based.

Differences between groups were accepted as statistically significant if the level of significance was .05, or lower.

Tables 23 & 24 present the directional scores of both positive and negative responses, by comparing all four groups with respect to sex, race, and college division, on the semantic differential. In these tables,

Category = male, female; white Caucasion, all other races; arts and science, vocational;

T_1 = treatment group with pre-semantic differential test;

C_1 = control group with pre-semantic differential test;

T_2 = treatment group without pre-semantic differential test;

C_2 = control group without pre-semantic differential test;

Chi Square = the score upon which the probability (p), or the difference between groups, is based.

Differences between groups were accepted as statistically significant if the level of significance was .05, or lower.

(Text continued on page 78.)

TABLE 11

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	T_1*	C_1*	$T_1 - C_1$	Chi square	p
Political Science	.141	.000	.141	2.730	
Course Unit	.927	.850	.077	1.151	
Elected Officials	.792	.650	.142	2.313	
Republican Party	.979	.850	.129	6.335	.02
Democratic Party	.708	.625	.083	.562	
Party Loyalty	.792	.658	.134	1.953	
Decision-Making	.813	.949	-.136	3.289	
Simulation Games	.969	.949	.020	.003	
Re-Election	.781	.625	.156	.233	
Political Speeches	.917	.625	.292	15.081	.001
Responsibility	.719	.525	.194	3.909	.05
Election	.844	.950	-.106	3.966	.05
Congress	.927	.950	-.023	.754	
Democratic System	.854	.900	.046	.992	
TOTAL INSTRUMENT	.805	.707	.098	20.702	.001

*T_1 = ratio of number of positive responses to total responses for T_1

*C_1 = ratio of number of positive responses to total responses for C_1

TABLE 12

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	T_1*	T_2*	$T_1 - T_2$	Chi square	p
Political Science	.141	.300	-.159	8.144	.01
Course Unit	.927	.833	.094	2.731	
Elected Officials	.792	.573	.219	8.902	.01
Republican Party	.979	.771	.208	15.985	.001
Democratic Party	.708	.667	.041	1.629	
Party Loyalty	.792	.805	-.013	.172	
Decision-Making	.813	.625	.188	6.450	.02
Simulation Games	.969	.139	.830	invalid	
Re-Election	.781	.456	.325	17.038	.001
Political Speeches	.917	.611	.306	21.036	.001
Responsibility	.719	.555	.164	4.119	.05
Election	.844	.764	.080	1.223	
Congress	.927	.750	.177	8.835	.01
Democratic System	.854	.735	.119	2.864	
TOTAL INSTRUMENT	.805	.666	.139	7.008	.01

*T_1 = ratio of number of positive responses to total responses for T_1

*T_2 = ratio of number of positive responses to total responses for T_2

TABLE 13

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	T_1*	C_2*	$T_1 - C_2$	Chi square	p
Political Science	.141	.053	.088	2.689	
Course Unit	.927	.805	.122	4.500	.05
Elected Officials	.792	.722	.070	.744	
Republican Party	.979	.763	.216	16.923	.001
Democratic Party	.708	.500	.208	6.714	.01
Party Loyalty	.792	.625	.167	4.847	.05
Decision-Making	.813	.639	.174	5.548	.02
Simulation Games	.969	.861	.108	5.254	.05
Re-Election	.781	.611	.170	4.970	.05
Political Speeches	.917	.722	.195	9.834	.01
Responsibility	.719	.686	.033	.083	
Election	.844	.861	-.017	4.865	.05
Congress	.927	.875	.052	.761	
Democratic System	.854	.809	.045	.311	
TOTAL INSTRUMENT	.805	.678	.127	11.680	.001

*T_1 = ratio of number of positive responses to total responses for T_1

*C_2 = ratio of number of positive responses to total responses for C_2

TABLE 14

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	C_1*	T_2*	$C_1 - T_2$	Chi square	p
Political Science	.000	.300	-.300	2.689	
Course Unit	.850	.833	.017	4.500	.05
Elected Officials	.650	.573	.077	.744	
Republican Party	.850	.771	.079	16.923	.001
Democratic Party	.625	.667	.042	6.714	.01
Party Loyalty	.658	.805	-.147	4.847	.05
Decision-Making	.949	.625	.324	5.548	.02
Simulation Games	.949	.139	.810	5.254	.05
Re-Election	.625	.456	.169	4.970	.05
Political Speeches	.625	.611	.014	9.834	.01
Responsibility	.525	.555	.030	.083	
Election	.950	.764	.186	4.865	.05
Congress	.950	.750	.200	.761	
Democratic System	.900	.735	.165	.311	
TOTAL INSTRUMENT	.700	.666	.034	11.680	.001

*C_1 = ratio of number of positive responses to total responses for C_1

*T_2 = ratio of number of positive responses to total responses for T_2

TABLE 15

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	C_1*	C_2*	$C_1 - C_2$	Chi square	p
Political Science	.000	.053	-.053	1.552	
Course Unit	.850	.805	.045	.109	
Elected Officials	.650	.722	-.072	1.022	
Republican Party	.850	.763	.087	.700	
Democratic Party	.625	.500	.125	1.155	
Party Loyalty	.658	.625	.033	.017	
Decision-Making	.949	.639	.310	4.668	.05
Simulation Games	.949	.861	.088	1.207	
Re-Election	.625	.611	.014	.003	
Political Speeches	.625	.722	.097	1.629	
Responsibility	.525	.686	-.161	3.541	
Election	.950	.861	.089	1.296	
Congress	.950	.875	.075	.896	
Democratic System	.900	.809	.091	.707	
TOTAL INSTRUMENT	.700	.678	.022	1.200	

*C_1 = ratio of number of positive responses to total responses for C_1

*C_2 = ratio of number of positive responses to total responses for C_2

TABLE 16

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	C_2*	T_2*	$C_2 - T_2$	Chi square	p
Political Science	.053	.300	-.247	17.917	.001
Course Unit	.085	.833	-.028	.422	
Elected Officials	.722	.573	.149	3.080	
Republican Party	.763	.771	-.008	.093	
Democratic Party	.500	.667	-.167	4.828	.05
Party Loyalty	.625	.805	-.180	6.683	.01
Decision-Making	.639	.625	.014	.119	
Simulation Games	.861	.139	.722	2.792	
Re-Election	.611	.456	.155	2.792	
Political Speeches	.722	.611	.111	1.531	
Responsibility	.686	.555	.131	3.861	.05
Election	.861	.764	.097	1.641	
Congress	.875	.750	.125	2.917	
Democratic System	.809	.735	.074	.668	
TOTAL INSTRUMENT	.678	.666	.012	.200	

*C_2 = ratio of number of positive responses to total responses for C_2

*T_2 = ratio of number of positive responses to total responses for T_2

TABLE 17

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	T_1*	C_1*	$T_1 - C_1$	Chi square	p
Political Science	.750	.083	.667	44.060	.001
Course Unit	.042	.050	-.008	4.540	.05
Elected Officials	.042	.075	-.033	1.506	
Republican Party	.000	.025	-.025	.205	
Democratic Party	.104	.000	.104	2.902	
Party Loyalty	.010	.000	.010	.232	
Decision-Making	.042	.000	.042	.060	
Simulation Games	.010	.000	.010	.218	
Re-Election	.083	.100	-.017	.414	
Political Speeches	.010	.025	-.015	.019	
Responsibility	.083	.200	-.117	4.911	.05
Election	.000	.000	.000	1.204	
Congress	.000	.000	.000	1.204	
Democratic System	.021	.025	-.004	.604	
TOTAL INSTRUMENT	.077	.092	-.015	1.500	

*T_1 = ratio of number of negative responses to total responses for T_1

*C_1 = ratio of number of negative responses to total responses for C_1

TABLE 18

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	T_1*	T_2*	$T_1 - T_2$	Chi square	p
Political Science	.750	.600	.150	3.759	
Course Unit	.042	.028	.014	.003	
Elected Officials	.042	.183	-.141	10.796	.01
Republican Party	.000	.043	-.043	2.211	
Democratic Party	.104	.194	-.090	.335	
Party Loyalty	.010	.111	-.101	10.333	.01
Decision-Making	.042	.181	-.139	10.320	.01
Simulation Games	.010	.014	-.004	.263	
Re-Election	.083	.015	.068	2.412	
Political Speeches	.010	.083	-.073	7.456	.01
Responsibility	.083	.181	-.098	4.500	.05
Election	.000	.028	-.028	.853	
Congress	.000	.042	-.042	2.034	
Democratic System	.021	.074	-.053	4.148	.05
TOTAL INSTRUMENT	.077	.133	-.056	18.688	.001

*T_1 = ratio of number of negative responses to total responses for T_1

*T_2 = ratio of number of negative responses to total responses for T_2

TABLE 19

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	T_1*	C_2*	$T_1 - C_2$	Chi square	p
Political Science	.750	.855	-.105	3.549	
Course Unit	.042	.083	-.041	2.128	
Elected Officials	.042	.069	-.027	1.293	
Republican Party	.000	.069	-.069	4.676	.05
Democratic Party	.104	.222	-.118	5.332	.05
Party Loyalty	.010	.153	-.143	10.516	.01
Decision-Making	.042	.069	-.027	1.293	
Simulation Games	.010	.000	.010	.020	
Re-Election	.083	.111	-.028	.761	
Political Speeches	.010	.014	-.004	.263	
Responsibility	.083	.129	-.046	1.406	
Election	.000	.000	.000	1.020	
Congress	.000	.000	.000	1.020	
Democratic System	.021	.015	.006	.100	
TOTAL INSTRUMENT	.077	.131	-.054	18.683	.001

*T_1 = ratio of number of negative responses to total responses for T_1

*C_2 = ratio of number of negative responses to total responses for C_2

TABLE 20

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	C_1*	T_2*	$C_1 - T_2$	Chi square	p
Political Science	.083	.600	-.517	29.040	.001
Course Unit	.050	.028	.022	.005	
Elected Officials	.075	.183	-.108	3.421	
Republican Party	.025	.043	-.018	.002	
Democratic Party	.000	.194	-.194	6.806	.01
Party Loyalty	.000	.111	-.111	3.054	
Decision-Making	.000	.181	-.181	6.505	.02
Simulation Games	.000	.014	-.014	.097	
Re-Election	.100	.015	.085	2.442	
Political Speeches	.025	.083	-.058	.663	
Responsibility	.200	.181	-.019	.255	
Election	.000	.028	-.028	.101	
Congress	.000	.042	-.042	.487	
Democratic System	.025	.074	-.049	1.130	
TOTAL INSTRUMENT	.092	.133	-.041	4.659	.05

*C_1 = ratio of number of negative responses to total responses for C_1

*T_2 = ratio of number of negative responses to total responses for T_2

TABLE 21

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	C_1*	C_2*	$C_1 - C_2$	Chi square	p
Political Science	.683	.855	-.172	57.329	.001
Course Unit	.050	.083	-.033	1.079	
Elected Officials	.075	.069	.006	.074	
Republican Party	.025	.069	-.044	.316	
Democratic Party	.000	.222	-.222	8.174	.01
Party Loyalty	.000	.153	-.153	4.846	.05
Decision-Making	.000	.069	-.069	1.507	
Simulation Games	.000	.000	.000	4.387	.05
Re-Election	.100	.111	-.011	.250	
Political Speeches	.025	.014	.011	.101	
Responsibility	.200	.129	.071	.515	
Election	.000	.000	.000	1.088	
Congress	.000	.000	.000	1.088	
Democratic System	.025	.015	.010	.126	
TOTAL INSTRUMENT	.092	.131	-.039	4.674	.05

*C_1 = ratio of number of negative responses to total responses for C_1

*C_2 = ratio of number of negative responses to total responses for C_2

TABLE 22

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

CATEGORY	C_2*	T_2*	$C_2 - T_2$	Chi square	p
Political Science	.855	.600	.255	14.557	.001
Course Unit	.083	.028	.055	.422	
Elected Officials	.069	.183	-.114	3.088	
Republican Party	.069	.043	.026	.101	
Democratic Party	.222	.194	.028	4.828	.05
Party Loyalty	.153	.111	.042	6.683	.01
Decision-Making	.069	.181	-.112	.119	
Simulation Games	.000	.014	-.014	invalid	
Re-Election	.111	.015	-.004	2.792	
Political Speeches	.014	.083	-.069	1.531	
Responsibility	.129	.181	-.052	2.029	
Election	.000	.028	-.028	1.641	
Congress	.000	.042	-.042	2.917	
Democratic System	.015	.074	-.059	.668	
TOTAL INSTRUMENT	.131	.133	-.002	.201	

*C_2 = ratio of number of negative responses to total responses for C_2

*T_2 = ratio of number of negative responses to total responses for T_2

TABLE 23

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

Groups	Category	X^{2*}	p	Groups	Category	X^{2*}	p
T_1-C_1:	Males	24.519246	.001	C_2-T_2:	Males	4.373451	.05
	Females	.256872			Females	.184128	
	Whites	19.645560	.001		Whites	.000000	
	Others	1.509760			Others	13.820200	.001
	Arts & Science	11.620280	.001		Arts & Science	7.223940	.01
	Vocational	18.137028	.001		Vocational	.830208	
T_1-T_2:	Males	59.569284	.001	C_1-C_2:	Males	2.086580	
	Females	3.392760			Females	.254305	
	Whites	30.408396	.001		Whites	.069784	
	Others	29.666560	.001		Others	.619311	
	Arts & Science	44.682687	.001		Arts & Science	8.683584	.01
	Vocational	18.209760	.001		Vocational	2.971942	
T_1-C_2:	Males	50.268512	.001	C_2-T_2:	Males	.576460	
	Females	3.529360			Females	.019695	
	Whites	36.854734	.001		Whites	.130743	
	Others	2.975805			Others	3.466155	
	Arts & Science	50.748480	.001		Arts & Science	.030910	
	Vocational	5.188586	.05		Vocational	1.178470	

X^{2*} = ratio of number of positive responses to total responses for the total instrument.

TABLE 24

DIRECTIONAL SCORES, SEMANTIC DIFFERENTIAL

Groups	Category	X^{2*}	p	Groups	Category	X^{2*}	p
T_1-C_1	Males	2.933940		C_2-T_2:	Males	6.954120	.001
	Females	3.385536			Females	1.316784	
	Whites	.241032			Whites	5.358150	.05
	Others	.078400			Others	.137600	
	Arts & Science	.629800			Arts & Science	8.595765	.01
	Vocational	1.265280			Vocational	.005076	
T_1-T_2:	Males	23.570580	.001	C_1-C_2:	Males	6.894112	.01
	Females	.166320			Females	.915498	
	Whites	14.709938	.001		Whites	4.404444	.05
	Others	.487424			Others	.204897	
	Arts & Science	17.203004	.001		Arts & Science	6.645576	.01
	Vocational	2.603080			Vocational	1.028230	
T_1-C_2:	Males	23.730112	.001	C_2-T_2:	Males	.001517	
	Females	.551855			Females	.108575	
	Whites	12.834480	.001		Whites	.118206	
	Others	.504175			Others	.458766	
	Arts & Science	14.402320	.001		Arts & Science	.317530	
	Vocational	7.451628	.01		Vocational	1.378378	

X^{2*} = ratio of number of negative responses to total responses for the total instrument.

Polarity. Analysis of variance and the t-test were used in conjunction with each other in determining the degree of polarization of attitudes. This was done because the F-ratio, produced by analysis of variance, indicated whether or not there did, in fact, exist significant differences among the mean scores of any of the four groups. The t-test was then employed as the second step after it appeared that means were significantly different. This procedure had the great advantage of using a more accurate standard deviation than would have been available if analysis of variance had not been used.

Differences in degree of polarity of attitudes were analyzed by assigning numeric values to the possible response positions for each student on each item of the semantic differential as illustrated below:

Interesting 3 : 2 : 1 : 0 : 1 : 2 : 3 Uninteresting

Means were then computed for each question on the semantic differential as well as for the total instrument. Statistical significance for the difference between means was determined by t-tests, using the formulae in Ferguson (1966, pp. 167-168):

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s^2}{N_1} + \frac{s^2}{N_2}}} \qquad \text{when} \qquad s^2 = \frac{\Sigma X_1^2 + \Sigma X_2^2 - \frac{(\Sigma X_1)^2}{N} - \frac{(\Sigma X_2)^2}{N}}{N_1 + N_2 - 2}$$

Variances in the two groups were considered sufficiently alike to permit the employment of the t-test. In these tables,

Category = the items in the semantic differential;

T_1 = treatment group with pre-semantic differential test;

C_1 = control group with pre-semantic differential test;

T_2 = treatment group without pre-semantic differential test;

C_2 = control group without pre-semantic differential test;

N = degrees of freedom;

$\overline{X}$ = mean;

ΣX^2 = sum of x^2;

t = the score upon which the probability (p), or the differences between groups, is based.

Differences between groups were accepted as statistically significant at the .05 level of significance, or higher.

Tables 25-30 present the degree of polarity of attitudes, by comparing all four groups, as expressed on the semantic differential.

Table 31 presents the degree of polarity of attitudes, by comparing males, white Caucasions, and arts and science students in all four groups, as expressed on the semantic differential. Comparisons were not made with females, minority ethnic groups, and vocational students because of insufficient numbers.

(Text continued on page 87.)

TABLE 25

MEAN POLARITY SCORES, SEMANTIC DIFFERENTIAL
(SUM OF WEIGHTED RESPONSES)

CATEGORY	T_1			C_1			$\bar{X}_{t_1} - \bar{X}_{c_1}$	t	p
	N_{t_1}	$\bar{X}_{t_1}$	$\Sigma X^2_{t_1}$	N_{c_1}	$\bar{X}_{c_1}$	$\Sigma X^2_{c_1}$			
Political Science	22	2.11	103.7500	14	2.16	70.9375	-.05	.2618	
Course Unit	24	1.76	80.9300	14	1.91	58.4375	-.15	.1423	
Elected Officials	24	1.53	70.4300	14	1.43	40.7500	.10	.2033	
Republican Party	24	1.89	94.0600	14	1.93	57.8125	-.04	.1941	
Democratic Party	24	1.49	68.1800	14	1.27	32.0625	.22	.7932	
Party Loyalty	24	1.48	71.0000	14	1.25	36.3750	.23	.7144	
Decision-Making	24	1.73	88.1250	14	1.39	39.8750	.34	1.1249	
Simulation Games	24	2.06	113.6250	14	2.00	67.0000	.06	.2255	
Re-Election	24	1.53	73.8125	14	1.79	59.1250	-.23	.9143	
Political Speeches	24	1.64	73.8125	14	1.23	31.7875	.41	1.6542	
Responsibility	24	1.48	70.0000	14	1.36	34.0000	.12	1.1084	
Election	24	1.77	95.2500	14	1.79	52.7500	-.02	.0337	
Congress	24	2.08	122.3750	14	2.25	80.2500	-.17	.5744	
Democratic System	24	1.89	96.4375	13	1.93	63.6250	-.04	.2653	
TOTAL INSTRUMENT	24	1.66	78.1352	14	1.68	44.9860	-.02	.1046	

Degrees of freedom = $N_{t_1} + N_{c_1} - 2$

TABLE 26

MEAN POLARITY SCORES, SEMANTIC DIFFERENTIAL (SUM OF WEIGHTED RESPONSES)

CATEGORY	T_1			T_2			$\bar{X}_{t_1} - \bar{X}_{t_2}$	t	p
	N_{t_1}	$\bar{X}_{t_1}$	$\Sigma X^2_{t_1}$	N_{t_2}	$\bar{X}_{t_2}$	$\Sigma X^2_{t_2}$			
Political Science	22	2.11	103.7500	20	2.20	100.3750	-.09	.5814	
Course Unit	24	1.76	80.9300	18	1.84	74.3125	-.08	.3679	
Elected Officials	24	1.53	70.4300	18	1.60	58.0625	-.07	.2658	
Republican Party	24	1.89	94.0600	18	1.69	69.3750	.20	1.4327	
Democratic Party	24	1.49	68.1800	18	1.88	78.0625	-.39	1.4326	
Party Loyalty	24	1.48	71.0000	18	1.88	76.0250	-.40	1.4890	
Decision-Making	24	1.73	88.1250	18	1.60	55.8125	.13	.6174	
Simulation Games	24	2.06	113.6250	18	1.92	79.7500	.14	.5799	
Re-Election	24	1.53	73.8125	17	.78	26.4375	.75	2.5491	.02
Political Speeches	24	1.64	73.8125	18	1.32	47.8125	.32	1.2729	
Responsibility	24	1.48	70.0000	18	1.24	36.9375	.24	.9534	
Election	24	1.77	95.2500	18	1.65	61.8125	.12	.4165	
Congress	24	2.08	122.3750	18	1.83	77.8750	.25	.8389	
Democratic System	24	1.89	96.4375	17	1.78	69.4375	.11	.2969	
TOTAL INSTRUMENT	24	1.66	78.1352	20	1.67	62.3962	-.01	.0702	

Degrees of freedom = $N_{t_1} + N_{t_2} - 2$

TABLE 27

MEAN POLARITY SCORES, SEMANTIC DIFFERENTIAL (SUM OF WEIGHTED RESPONSES)

CATEGORY	T_1			C_2			$\bar{X}_{t_1} - \bar{X}_{c_2}$	t	p
	N_{t_1}	$\bar{X}_{t_1}$	$\Sigma X^2_{t_1}$	N_{c_2}	$\bar{X}_{c_2}$	$\Sigma X^2_{c_2}$			
Political Science	22	2.11	103.7500	14	2.46	88.2500	-.35	2.0483	.05
Course Unit	24	1.76	80.9300	14	1.77	58.6406	-.01	.0301	
Elected Officials	24	1.53	70.4300	14	1.36	31.8314	.17	.6672	
Republican Party	24	1.89	94.0600	14	1.73	49.8806	.16	.0164	
Democratic Party	24	1.49	68.1800	14	1.91	66.8125	-.42	1.3561	
Party Loyalty	24	1.48	71.0000	14	1.93	66.7500	-.45	1.3894	
Decision-Making	24	1.73	88.1250	14	1.23	32.0625	.50	1.7041	
Simulation Games	24	2.06	113.6250	14	2.16	74.1875	-.10	.3982	
Re-Election	24	1.53	73.8125	14	1.34	36.3125	.19	.6350	
Political Speeches	24	1.64	73.8125	14	1.63	44.0625	.01	.0655	
Responsibility	24	1.48	70.0000	14	1.84	57.8125	-.36	1.2124	
Election	24	1.77	95.2500	14	2.20	75.0625	-.43	1.4504	
Congress	24	2.08	122.3750	14	2.25	82.3750	-.17	.5565	
Democratic System	24	1.89	96.4375	14	2.05	69.3125	-.16	1.8241	
TOTAL INSTRUMENT	24	1.66	78.1352	14	1.85	49.4499	-.19	.9208	

Degrees of freedom = $N_{t_1} + N_{c_2} - 2$

TABLE 28

MEAN POLARITY SCORES, SEMANTIC DIFFERENTIAL (SUM OF WEIGHTED RESPONSES)

CATEGORY	C_1			T_2			$\bar{X}_{c_1} - \bar{X}_{t_2}$	t	p
	N_{c_1}	$\bar{X}_{c_1}$	$\Sigma X^2_{c_1}$	N_{t_2}	$\bar{X}_{t_2}$	$\Sigma X^2_{t_2}$			
Political Science	14	2.16	70.9375	20	2.20	100.3750	-.04	.2038	
Course Unit	14	1.91	58.4375	18	1.84	74.3125	.07	.2393	
Elected Officials	14	1.43	40.7500	18	1.60	58.0625	-.17	.5211	
Republican Party	14	1.93	57.8125	18	1.69	69.3750	.24	.7640	
Democratic Party	14	1.27	32.0625	18	1.88	78.0625	-.61	1.8849	
Party Loyalty	14	1.25	36.3750	18	1.88	76.0250	-.63	1.8906	
Decision-Making	14	1.39	39.3750	18	1.60	55.8125	-.21	.5607	
Simulation Games	14	2.00	67.0000	18	1.92	79.7500	.08	.2583	
Re-Election	14	1.79	59.1250	17	.78	26.4375	1.01	2.7263	.01
Political Speeches	14	1.23	31.1875	18	1.32	47.8125	-.09	.2674	
Responsibility	14	1.36	34.0000	18	1.24	36.9375	.12	.4533	
Election	14	1.79	52.7500	18	1.65	61.8125	.14	.4784	
Congress	14	2.25	80.2500	18	1.83	77.8750	.42	1.2789	
Democratic System	13	1.93	63.6250	17	1.78	69.4375	.15	.4495	
TOTAL INSTRUMENT	14	1.68	44.9860	20	1.67	62.3962	.01	.0394	

Degrees of freedom = $N_{c_1} + N_{t_2} - 2$

TABLE 29

MEAN POLARITY SCORES, SEMANTIC DIFFERENTIAL
(SUM OF WEIGHTED RESPONSES)

CATEGORY	C_1			C_2			$\bar{X}_{c_1} - \bar{X}_{c_2}$	t	p
	N_{c_1}	$\bar{X}_{c_1}$	$\Sigma X^2_{c_1}$	N_{c_2}	$\bar{X}_{c_2}$	$\Sigma X^2_{c_2}$			
Political Science	14	2.16	70.9375	14	2.46	88.2500	-.30	1.3830	
Course Unit	14	1.91	58.4375	14	1.77	58.6406	.14	.4070	
Elected Officials	14	1.43	40.7500	14	1.36	31.8314	.07	.2136	
Republican Party	14	1.93	57.8125	14	1.73	49.8806	.20	.7656	
Democratic Party	14	1.27	32.0625	14	1.91	66.8125	.64	1.7198	
Party Loyalty	14	1.25	36.3750	14	1.93	66.7500	-.68	1.6946	
Decision-Making	14	1.39	39.8750	14	1.23	32.0625	.16	.4392	
Simulation Games	14	2.00	67.0000	14	2.16	74.1875	-.16	.4869	
Re-Election	14	1.79	59.1250	14	1.34	36.3125	.45	1.2000	
Political Speeches	14	1.23	31.1875	14	1.63	44.0625	-.40	1.2914	
Responsibility	14	1.36	34.0000	14	1.84	57.8125	-.48	1.0397	
Election	14	1.79	52.7500	14	2.20	75.0625	-.41	1.3868	
Congress	14	2.25	80.2500	14	2.25	82.3750	.00	.0000	
Democratic System	13	1.93	63.6250	14	2.05	69.3125	-.12	.3798	
TOTAL INSTRUMENT	14	1.68	44.9860	14	1.85	49.4499	-.17	1.9706	

Degrees of freedom = $N_{c_1} + N_{c_2} - 2$

TABLE 30

MEAN POLARITY SCORES, SEMANTIC DIFFERENTIAL (SUM OF WEIGHTED RESPONSES)

CATEGORY	C_2			T_2			$\bar{X}_{c_2} - \bar{X}_{t_2}$	t	p
	N_{c_2}	$\bar{X}_{c_2}$	$\Sigma X^2_{c_2}$	N_{t_2}	$\bar{X}_{t_2}$	$\Sigma X^2_{t_2}$			
Political Science	14	2.46	88.2500	20	2.20	100.3750	.26	1.5350	
Course Unit	14	1.77	58.6406	18	1.84	74.3125	-.07	.2106	
Elected Officials	14	1.36	31.8314	18	1.60	58.0625	-.24	.8499	
Republican Party	14	1.73	49.8806	18	1.69	69.3750	.04	.0946	
Democratic Party	14	1.91	66.8125	18	1.88	78.0625	.03	.0994	
Party Loyalty	14	1.93	66.7500	18	1.88	76.0250	.05	.1196	
Decision-Making	14	1:23	32.0625	18	1.60	55.8125	-.37	1.0983	
Simulation Games	14	2.16	74.1875	18	1.92	79.7500	.24	.7918	
Re-Election	14	1.34	36.3125	17	.78	26.4375	.56	1.5983	
Political Speeches	14	1.63	44.0625	18	1.32	47.8125	.31	.9675	
Responsibility	14	1.84	57.8125	18	1.24	36.9325	.60	2.0789	.05
Election	14	2.20	75.0625	18	1.65	61.8125	.55	1.8610	
Congress	14	2.25	82.3750	18	1.83	77.8750	.42	1.1919	
Democratic System	14	2.05	69.3125	17	1.78	69.4375	.27	.8039	
TOTAL INSTRUMENT	14	1.85	49.4499	20	1.67	62.3962	.18	1.0036	

Degrees of freedom = $N_{c_2} + N_{t_2} - 2$

TABLE 31

MEAN POLARITY SCORES, SEMANTIC DIFFERENTIAL
(SUM OF WEIGHTED RESPONSES)

Classification	Group a	Group b	Number of Students a	Number of Students b	Means a	Means b	ΣX^2 a	ΣX^2 b	a-b	t
Male	T_1	C_1	15	14	1.65	1.71	43.6811	43.6404	-.06	.36762
	T_1	C_2	15	13	1.65	1.65	43.6811	40.1155	.00	.00000
	T_1	T_2	15	10	1.65	1.91	43.6811	37.5877	-.26	1.54064
	C_1	T_2	14	13	1.71	1.65	43.6404	40.1155	.06	.29121
	C_1	C_2	14	10	1.71	1.91	43.6404	37.5877	-.20	1.17508
	T_2	C_2	13	10	1.65	1.91	40.1155	37.5877	-.26	1.16838
White Caucasians	T_1	C_1	19	13	1.76	1.62	63.5616	36.6075	.14	.80803
	T_1	C_2	19	15	1.76	1.80	63.5616	53.8279	-.04	.21290
	T_1	T_2	19	13	1.76	1.84	63.5616	45.8018	-.08	.49452
	C_1	T_2	13	15	1.62	1.80	36.6075	53.8279	-.18	.88845
	C_1	C_2	13	13	1.62	1.84	36.6075	45.8018	-.22	1.36969
	T_2	C_2	15	13	1.80	1.84	53.8279	45.8018	-.04	.21047
Arts and Science	T_1	C_1	10	11	1.81	1.68	35.0230	32.9212	.13	.61725
	T_1	C_2	10	13	1.81	1.73	35.0230	42.9915	.08	.34776
	T_1	T_2	10	11	1.81	1.77	35.0230	35.5177	.04	.21448
	C_1	T_2	11	13	1.68	1.73	32.9212	42.9915	-.05	.23602
	C_1	C_2	11	11	1.68	1.77	32.9212	35.5177	-.09	.53921
	T_2	C_2	13	11	1.73	1.77	42.9915	35.5177	-.04	.20625

Degrees of freedom = Number of students a + b - 2.

The numbers of females, other ethnic groups and vocational students were not sufficiently large to calculate t-scores.

In the above comparisons, there were none which showed statistical significance.

Summary

A summary of the statistical findings for Null Hypotheses 1a will be presented in two parts. The first part will summarize the data concerning the direction of polarization of attitudes as indicated on the semantic differential; the second part will summarize the data concerning the degree of polarization.

Direction.--In comparing T_1 and C_1 (both of which had pre-semantic differential), the simulation experience was more effective in producing positive attitudes in each category, as well as for the total instrument. Differences between the two groups were statistically significant in two categories and in the total instrument at the .001 level of significance. (See Table 11.)

In comparing T_1 and T_2 (only T_1 had the pre-semantic differential), the simulation experience combined with the pre-semantic differential, was more effective than just unit participation in producing positive attitudes in eight categories, as well as for the total instrument. Differences between the two groups were statistically significant in eight categories and in the total instrument. (See Table 12.)

In comparing T_1 and C_2 (only T_1 had the pre-semantic differential), the simulation experience combined with the pre-semantic differential, was more effective in producing positive attitudes in nine categories, as well as for the total instrument. Differences between the two groups were

statistically significant in nine categories and in the total instrument. (See Table 13.)

In comparing C_1 and T_2 (only C_1 had the pre-semantic differential), the simulation experience was more effective in producing positive attitudes in four of the categories and not in the total instrument. However, differences between the two groups were statistically significant in five categories and in the total instrument. (See Table 14.)

In comparing C_1 and C_2 (only C_1 had the pre-semantic differential, and neither had the simulation experience), the pre-test experience was more effective in producing positive attitudes in one category. Differences between the two groups were statistically significant in only one category and not at all in the total instrument. (See Table 15.)

In comparing C_2 and T_2 (neither of which had the pre-semantic differential), the simulation experience was more effective in producing positive attitudes in four categories and not in the total instrument. Differences between the two groups were statistically significant in four categories and not at all in the total instrument. (See Table 16.)

In comparing T_1 and C_1 (both of which had the pre-semantic differential), the simulation group showed positive attitudes in one category and in the total instrument. Differences between the two groups were statistically significant in three categories and not at all in the total instrument. (See Table 17.)

In comparing T_1 and T_2 (only T_1 had the pre-semantic differential), the simulation group not exposed to the pre-semantic differential experience, showed positive attitudes in six categories and in the total instrument. Differences between the two groups were statistically significant in six categories and in the total instrument. (See Table 18.)

In comparing T_1 and C_2 (only T_1 had the pre-semantic differential), the control group showed positive attitudes in three categories and in the total instrument. Differences between the two groups were statistically significant in three categories and in the total instrument. (See Table 19.)

In comparing C_1 and T_2 (only C_1 had the pre-semantic differential), the simulation group showed positive attitudes in three categories and in the total instrument. Differences between the two groups were statistically significant in three categories and in the total instrument. (See Table 20.)

In comparing C_1 and C_2 (only C_1 had the pre-semantic differential), the group not having had the pre-semantic differential showed positive responses in four categories and in the total instrument. Differences between the two groups were statistically significant in four categories and in the total instrument. (See Table 21.)

In comparing C_2 and T_2 (neither of which had the pre-semantic differential), the control group showed positive responses in three categories and not in the total instrument.

Differences between the two groups were statistically significant in three categories and not at all in the total instrument. (See Table 22.)

In summarizing, the direction of polarization of attitudes of positive responses was greatest in the categories of the Republican Party and Political Speeches; and to a lesser extent, in the categories of Decision-Making, Re-Election, and Election. The direction of polarization of attitudes of negative responses was greatest in the categories of Party Loyalty, Political Science, and the Democratic Party; and to a lesser extent, in the category of Responsibility.

Additional Chi square tests were made, comparing all four groups with each other and dividing the group according to sex, race (white Caucasians - all other) and college division (arts and science - vocational, which includes business and technical courses). The findings may be seen in Tables 23 and 24.

According to Guilford (p. 582), when χ^2 equals 3.841, there is statistical significance at the .05 level; 6.635, at the .01 level; and 10.827, at the .001 level. The greatest significance was shown between groups enrolled in the Arts and Science Division who showed statistical significance in nine out of twelve categories. The next greatest significance was shown by males who showed statistical significance in eight out of twelve categories. The third greatest significance was shown by white Caucasians who showed statistical

significance in seven out of twelve categories. The fourth highest, by groups enrolled in vocational programs who showed statistical significance in four out of twelve categories. The group to show the least statistical significance was the other ethnic groups who showed a significant difference in two out of twelve categories. The females showed no statistically significant difference in any comparisons between groups. Rank ordering these groups gives the following information:

TABLE 32

RANK ORDERING OF GROUPS WITH RESPECT TO THE GREATEST OCCURRENCE OF STATISTICALLY SIGNIFICANT DIFFERENCES

	Positive Responses	Negative Responses	Total Responses
Arts and Science	5	4	9
Males	4	4	8
White Causasians	3	4	7
Vocational	3	1	4
All Other Races	2	0	2
Females	0	0	0

From these data, it would appear that there were two elements working in concert effectively producing positive attitudes in responses to the overall instrument. The first, of course, was the simulation game NAPOLI. The second was the pre-semantic differential. From the data given, those subjects who were exposed to the pre-semantic differential were conditioned, prior to participation in the simulation experience, to think about, and possibly to decide upon, their stated attitudes concerning the fourteen concepts listed in the semantic differential.

The findings are also supported by the results found in Tables 23 and 24. On one hand, the greatest statistical significance was found among those who were exposed to the pre-semantic differential and the simulation experience. On the other hand, however, the greatest significant difference was shown by males, as opposed to females; by white Caucasian, as opposed to minority ethnic groups; and by those enrolled in arts and science programs, as opposed to students in vocational programs.

Thus, it would seem that the semantic differential, if constructed to present the concepts of a simulation game, conditions subjects to analyze their attitudes toward these concepts. Therefore, there were statistically significant differences between treatment (simulation) and control groups to be able to reject the null hypothesis at the .05 level of significance. These findings were supported by Heinkel in

his pilot study which evaluated NAPOLI as a teaching device. (Heinkel, 1968, pp. 5-7)

Before the null hypothesis may be totally rejected, however, the data concerning the degree of polarization of attitudes must needs be presented and summarized.

Polarity. For a more accurate t-score in determining the degree of polarity of attitudes, the sums of the responses for each category of the semantic differential were weighted. In other words, since all of the subjects did not respond to all categories of the semantic differential, the sums of the responses were calculated on the actual number of subjects responding to each category, not on the total number of subjects in each group.

In comparing T_1 and C_1 (both of which had the pre-semantic differential), the simulation group showed greater polarization of attitudes in no category and not in the total instrument. Differences between groups were statistically significant in no category and not at all in the total instrument. (See Table 25.)

In comparing T_1 and T_2 (only T_1 had the pre-semantic differential), the simulation group showed greater polarization of attitudes in one category but not in the total instrument. Differences between groups were statistically significant in one category and not at all in the total instrument. (See Table 26.)

In comparing T_1 and C_2 (only T_1 had the pre-semantic differential), the simulation group showed greater polarization of attitudes in one category but not in the total instrument. Differences between groups were statistically significant in one category and not at all in the total instrument. (See Table 27.)

In comparing C_1 and T_2 (only C_1 had the pre-semantic differential), the simulation group showed greater polarization of attitudes in one category but not in the total instrument. Differences between groups were statistically significant in one category and not at all in the total instrument. (See Table 28.)

In comparing C_1 and C_2 (only C_1 had the pre-semantic differential), the group having had the pre-semantic differential showed a greater polarization of attitudes in no category and not in the total instrument. Differences between groups were statistically significant in no category and not in the total instrument. (See Table 29.)

In comparing C_2 and T_2 (neither of which had the pre-semantic differential), the simulation group showed a greater polarization of attitudes in one category but not in the total instrument. Differences between groups were statistically significant in one category and not at all in the total instrument. (See Table 30.)

Additional t-scores were calculated, comparing the males, white Caucasians, and arts and science students in all

four groups. These findings may be seen in Table 31. Comparisons were not made for females, other ethnic groups, and vocational students due to the fact that the numbers in these categories in the study sample were insufficient because of attrition.

In comparing males, white Caucasians, and arts and science students in all four groups, none of the t-scores were sufficiently large to indicate any statistically significant differences.

In considering the two aspects of Null Hypothesis 1a, (direction and degree of polarity), it would appear that the pre-semantic differential conditioned the participants in this study toward the more positive polarization of attitudes in the area of direction of polarity and did not condition the participants, to any significant extent, in the other area of degree of polarity. Therefore, it would seem that the pre-semantic differential is a significant factor in shaping, modifying and changing attitudes in the area of direction and not a significant factor in the area of degree of polarity. This information would be of value to anyone engaged in the field of modification of attitudes and could influence the manner in which the task was approached, depending on whether or not preference determined interest in or concentration upon direction of polarization, degree of polarization, or both.

In summary, the degree of polarization of attitudes was greatest in the categories of the Democratic Party; and to a lesser extent in the categories of Re-Election and Elections.

From these data, therefore, there was no statistically significant difference between treatment and control groups on post-testing with the semantic differential in degree of polarization of attitudes, and in no case could the null hypothesis be rejected at the .05 level of significance. Whatever degree of polarization of attitudes might have resulted from exposure to simulation was apparently not great enough to cause a difference between groups. These findings were not supported by Heinkel in his pilot study, which evaluated NAPOLI as a teaching device. (Heinkel, 1968, pp. 7-9)

However, since this null hypothesis could have been rejected on the basis of direction of polarization and accepted on the basis of degree of polarization, it may be rejected or accepted, depending upon whether one is measuring direction of polarization or degree of polarization of attitudes. The aptitude differences between groups may account for the difference in the findings of this study and more in Heinkel's pilot study (1968, pp. 7-9) with respect to direction and degree of polarization of attitudes.

Null Hypothesis 1b

There will be no statistically significant difference between treatment and control groups in degree of implied

motivation as indicated by scores on delayed post-test (final examination).

Findings

For the purpose of testing Null Hypothesis 1b, a delayed post-test, Midterm II, was used. (For a description of this test, see Chapter III.) An analysis of covariance was selected to test the null hypothesis by comparing the test scores of Midterm II. There were two reasons for this choice: (1) an inability to select randomly, to assign, or to match subjects, and (2) the group differences evident in the pre-tests. Biomedical Computer Program BMD04V, "Analysis of Covariance with Multiple Covariates" was used. (Dixon, 1967, pp. 525-542) Resulting F-ratios were interpreted for statistical significance. Based on the assumption that motivation affected learning as evidenced by scores on a cognitive test; it was further assumed that if there were significant differences on a delayed test, these differences could probably be attributed to student motivation caused by the simulation experience, re-inforced by the pre-test.

Summary

Table 31 presents the means of Midterm II, the adjusted means of the dependent variable (test scores) in the four analyses of covariance, the standard error of each mean, and the F-ratios (showing the degrees of freedom) from the analyses of covariance.

Although the control groups (C_1 and C_2) had higher adjusted means on Midterm II than the simulation groups, the difference was not statistically significant.

The F-ratio for Midterm II for 3,70 degrees of freedom was .553. At the .05 level of significance, the F-ratio must be 2.74 or higher. (Ferguson, 1966, p. 411) Therefore, there is no statistically significant difference between treatment and control groups on Midterm II in degree of implied motivation, and in no case could the null hypothesis have been rejected at the .05 level of significance. Whatever motivation that might have resulted from exposure to simulation was apparently not strong enough to cause a difference in delayed post-test cognitive scores.

Table 33

Treatment Means, Adjusted Means, Standard Error of Adjusted Means, F-ratio, and Degrees of Freedom for Midterm II. (For a complete table of analysis of covariance for Midterm II, see Appendix G.)

GROUP	TM	AM	S/E of AM	F	df
T_1	108.1250	110.4467	5.7220	.553	3,70
C_1	113.6667	111.3592	8.3293		
T_2	111.6190	109.8843	5.5194		
C_2	118.1579	118.6000	5.6032		

Null Hypothesis 2

There will be no statistically significant difference between treatment and control groups scores on post-test of cognitive skills.

Findings

For the purpose of testing Null Hypothesis 2, one immediate post-test (Mid-term I), four delayed post-tests (U. S. Government, Hyink 5-9, Midterm II, and Hyink 10-13), and the final course grade were compared. (For a description of these tests, see Chapter III.) The five tests and the final course grade were used as variables, and an analysis of covariance was selected to test the null hypothesis by comparing the scores of all four groups. There were two reasons underlying this choice: (1) an inability to select randomly, to assign, or to match subjects, and (2) the group differences evident in the pre-tests. Biomedical Computer Program BMD04V, "Analysis of Covariance with Multiple Covariates" was used. (Dixon, 1967, pp. 525-542) Resulting F-ratios were interpreted for statistical significance.

Summary

Table 34 presents the means of the five post-tests of cognitive learning and of the final course grades, the adjusted means of the dependent variables in the four analyses of covariance, the standard error of each mean, and the F-ratios (showing the degrees of freedom) from the analyses of covariance.

Although the simulation groups (T_1 and T_2) had higher adjusted means on the immediate post-test (Midterm I) than the control groups (C_1 and C_2), the difference was not statistically significant.

For 3,70 degrees of freedom at the .05 level of significance, the F-ratio must be 2.74 or higher; at the .01 level of significance, 4.08 or higher. (Ferguson, 1966, p. 411) The F-ratio for Midterm I was 1.162; for U. S. Government, .129; for Hyink 5-9, .585; for Midterm II, .553; for Hyink 10-13, .071; for the final course grade, .379. Therefore, there were no statistically significant differences evidenced between treatment and control groups scores on post-tests of cognitive skills or on the final course grades, and in no case could the null hypothesis have been rejected at the .05 level of significance. These findings were supported by Heinkel in his pilot study which evaluated NAPOLI as a teaching device. (Heinkel, 1968, p. 4)

TABLE 34

Treatment Means, Adjusted Means, Standard Errors of Adjusted Means, F-ratios, and Degrees of Freedom for Post Cognitive Tests. (For complete tables of analysis of covariance for each post cognitive test, see Appendix G)

GROUP	TM	AM	S/E of AM	F	df
		Midterm I			
T_1	130.0000	132.5167	9.1083	1.162	3,70
C_1	132.0000	130.4251	13.2587		
T_2	143.5238	141.3955	8.7858		
C_2	151.6316	151.7997	8.9192		
		U. S. Government			
T_1	75.8750	74.6670	4.0923	.129	3,70
C_1	75.9167	77.8449	5.9571		
T_2	74.0476	74.7555	3.9474		
C_2	77.4211	76.9467	4.0074		
		Hyink 5-9			
T_1	84.7917	97.5813	17.2584	.585	3,70
C_1	89.6667	70.9302	25.1822		
T_2	84.6667	89.5041	16.1169		
C_2	115.4211	105.7527	17.8133		
		Midterm II			
T_1	108.1250	110.4467	5.7220	.553	3,70
C_1	113.6667	111.3592	8.3293		
T_2	111.6190	109.8843	5.5194		
C_2	118.1579	118.6000	5.6032		
		Hyink 10-13			
T_1	78.0000	78.8997	2.7894	.071	3,70
C_1	78.9167	77.5464	4.0605		
T_2	77.9048	77.3599	2.6907		
C_2	78.7368	79.0680	2.7315		
		Final Course Grade			
T_1	2.7083	2.6192	.1228	.379	3,70
C_1	2.6667	2.7875	.1787		
T_2	2.5238	2.5817	.1184		
C_2	2.6316	2.6038	.1202		

Null Hypothesis 3

There will be no statistically significant post-differences between treatment and control groups in amount of time spent in activities covered in the attached questionnaire. (See Appendix D.)

Findings

A wide variance was observed in the interpretation made by the seventy-six students in the sample regarding the information which was requested in the instrument used to gather data for testing the hypothesis.

Summary

The instrument was judged invalid. Therefore, no computations were made to test Null Hypothesis 3.

Summary

In Chapter IV, the data generated by the computer programs and by statistical calculations have been presented, analyzed, and interpreted with regard to the three null hypotheses of the study.

Null Hypothesis 1a stated that there would be no statistically significant difference between treatment and control groups in the degree of polarization of attitudes as indicated on the semantic differential. This hypothesis was examined from two standpoints: 1.) direction of polarization of attitudes, and 2.) degree of polarization of attitudes.

Chi square scores were calculated to test the direction of polarization of attitudes, and covariance analysis was made and t-scores were calculated to test the degree of polarization of attitudes.

It was found that positive responses were statistically significant in the categories of the Republican Party, Political Speeches, Decision-Making, Re-Election, and Election. Of these categories, degree of polarization of statistical significance was found in Re-Election and Election. Negative responses were statistically significant in the categories of Party Loyalty, Political Science, and the Democratic Party. Of these categories, degree of polarization of statistical significance was found in the category of the Democratic Party.

It was further found that Null Hypothesis 1a could be rejected at the .05 level of significance in teams of direction of polarization of attitudes. However, Null Hypothesis 1a could not be rejected in terms of degree of polarization of attitudes at the .05 level of significance.

Null Hypothesis 1b stated that there would be no statistically significant difference between treatment and control groups in degree of implied motivation as indicated by scores on the delayed post-test. By employing covariance analysis, Null Hypothesis 1b could not be rejected at the .05 level of significance.

Null Hypothesis 2 stated that there would be no

statistically significant difference between treatment and control groups scores on post-tests of cognitive skills. By employing covariance analysis, Null Hypothesis 2 could not be rejected at the .05 level of significance.

Null Hypothesis 3 stated that there would be no statistically significant difference between treatment and control groups in amount of indicated time spent in political activities covered in the attached questionnaire. (See Appendix D.) Due to the fact that a wide variance was observed in the interpretation of the questionnaire by the sample subjects, the instrument was judged invalid, and no computations were made to test Null Hypothesis 3.

CHAPTER V

RESULTS

One of the goals of education is to lead, guide, develop, and/or direct, not only cognitive materials, but also concepts and attitudes. This study has sought to undertake an evaluation of this goal within the framework of the course requirements of Political Science 10 at San Diego Mesa College and the simulation game NAPOLI. The instruments used to measure this goal may very well have limitations.

Following a general summary of the study, various strengths and weaknesses will be assessed; and implications which the study has developed will be presented. Finally, comments will be made relevant to areas for further study.

Summary

This study was an investigation of the differences in polarization of attitudes and degree of cognitive learning between treatment and control groups, the former having been exposed to a simulation experience.

One hundred fifty students were enrolled in four Political Science 10 classes in the Fall of 1968 at San Diego Mesa College; San Diego, California. Seventy-six students

completed the course requirements and became the actual sample, which was divided into two treatment and two control groups. One treatment and one control group received pre-tests; all groups received post-tests, using (1.) the semantic differential to test differences in positive and negative responses to political concepts and (2.) course unit tests to measure cognitive differences between groups. The data generated by these tests were analyzed by covariance analysis, and Chi square and t-scores were calculated. The results of the study indicated:

1. There were statistically significant differences in the direction of polarization of attitudes between groups exposed to a simulation experience and groups which were not.
2. There were statistically significant differences between groups (both treatment and control) which were given pre-semantic differential prior to the simulation experience and those which were not.
3. There were no statistically significant differences in degree of polarization of attitudes between groups exposed to a simulation experience and groups which were not.
4. There were no statistically significant differences in degree of implied motivation between groups exposed to simulation experience and groups which were not.

5. There were no statistically significant differences in increased learning of cognitive course material between groups exposed to a simulation experience and groups which were not.

Assessment of the Study

One of the strengths of the study is that it had a comprehensive design to test the various null hypotheses by testing for differences between groups in direction of polarization and by using covariance analysis in conjunction with t-scores for testing the degree of polarization. Covariance analysis was also used in testing for differences between groups regarding the mastery of cognitive skills and the degree of implied motivation.

The research was further strengthened by designing a semantic differential that is of a workable and usable length. Unfortunately, the desirable length allowed for testing only the dimension of evaluation of the concepts listed on the semantic differential.

The social desirability factor was possibly in operation while students were completing the semantic differential. For example, it is conceivable that some persons may evaluate political concepts highly, while at the same time having no active participation in politics or a high regard for preconditioned political concepts. A valid question could, therefore, have been raised as to how accurately the semantic

differential measured a person's actual political attitudes, as opposed to his stated political attitudes. In addition, the students were not told how the results of the research were to be used. Such a lack of information may have influenced some to be more cautious with their responses and thereby less revealing of their true feelings. Likewise, the students may have been unable to feel completely unrestricted in their responses on the semantic differential for concern that the instructor would know the results. This fear may have motivated some students in the direction of giving what they believed to be "textbook" responses instead of their personal opinions. The social desirability factor could conceivably have been partially avoided by a test--re-test situation.

The primary weakness of the study was revealed by the extremely high attrition in all four groups of the sample. Of the 150 subjects in the sample, only 76 remained to complete all course requirements. This condition, of course, created an adverse effect on the data and the findings.

From two standpoints, the high attrition was a predictable characteristic of the four Political Science 10 classes which constituted the sample. First of all, as a whole, although some were eager enough, the students were not of the highest academic calibre. For example, on the American College Tests, the mean composite score for the whole college population was 16.9; for the students in these

four classes, it was 16. Second, acute absenteeism, a forerunner of attrition, was a daily problem for the duration of the simulation game.

An insignificant knowledge of basic parliamentary procedures was another problem in these classes. During the simulation, arguments for and against bills were shallow, without substance, and failed to reflect any significant background of cognitive material already presented and discussed during the course.

After the first session with the first class exposed to NAPOLI (T_1), it became apparent that a more comprehensive explanation had to be provided by the instructor, especially concerning the regional caucuses. The NAPOLI manuals for both instructor and students were found to be weak.

After any run of NAPOLI is completed, participants are scored on the probability of re-election. Therefore, the desire for re-election builds into the game a certain amount of confusion and tension. In agreeing or disagreeing with one's party, NAPOLI comes closest to replicating the model, the U. S. House of Representatives. In the model, tension generally flows from party caucuses to party meetings. In NAPOLI, the tension seems to flow the other way

Implications of the Study

In this study, it was found that in the effects of simulation games only differences in the direction (desirble,

undesirable, positive, negative, etc.) of polarization of attitudes were statistically significant; however, differences in the degree of polarization of attitudes were not statistically significant. A question could be raised about the validity of the latter finding due to the high rate of attrition in the four sections of Political Science 10.

In view of the facts that:

1. participants in NAPOLI were scored on the probability of re-election;
2. in this study, NAPOLI was run immediately prior to the Republican victory in the general election of November 5, 1968, just over two months after the unfavorably publicized Chicago Democratic Convention; and
3. San Diego County consistently has voted Republican in elections despite the fact that registration of voters has shown a preponderance of Democrats,

it is noteworthy that statistically significant positive polarization of attitudes was in the direction and categories of the Republican Party, Political Speeches, Decision-Making, Re-Election, and Election, with statistically significant degree of polarization in the categories of Re-Election and Election. Negative polarization of attitudes was statistically significant in the direction and categories of Party Loyalty, Political Science, and the Democratic Party, with

statistically significant degree of polarization in the category of the Democratic Party.

Therefore, it would seem from the general movement of the country at this time, the Republican Party gained favor with many Democrats, and because of this ambivalence, they were rather hostile toward the concept of party loyalty. The anticipated change in Federal Government administration, no matter which party emerged the victor, would probably reinforce the concepts in NAPOLI of decision-making, political speeches, election, and re-election.

A corollary to these findings was that the simulation and the control groups which were given the pre-semantic differential test consistently produced more positive responses in polarization of attitudes. Therefore, it may be concluded that the semantic differential and simulation complement each other in that a semantic differential may be used prior to a simulation experience in order to assist sample subjects in defining and stating their attitudes concerning concepts presented in the simulation.

Another implication of this study, which has been borne out by previous studies, was that simulation experiences have had no statistically significant effect upon increasing the learning of cognitive material or increasing the degree of implied motivation through a better mastery of cognitive material.

An interesting by-product, not anticipated in the

original hypotheses, materialized in this study, to wit: attrition.

Of the 74 students who did not satisfactorily complete all course requirements, 33 per cent were females, which corresponds approximately to the male - female ratio in both the study sample and the total college population. Thirteen per cent of the attritional groups belonged to minority ethnic groups, which represent 17 per cent of the study sample and 7 per cent of the total college population. Thirty-three per cent were enrolled in vocational programs, which represent 35 per cent of the study sample and 30 per cent of the total college population. Therefore, even though the attrition rate by sex and college program is approximately comparable to the study sample and total college population ratios, the attrition rate among minority ethnic groups is almost double that of the percentage of these groups in the total college population.

An attrition rate of 50 per cent in these four sections of Political Science 10, coupled with the statistically significant undesirable polarization of attitudes in the direction of the category Political Science, might be of concern to the administration of the San Diego Community Colleges, as well as to the community at large. No criticism is implied or intended with regard to the course content or to the instructor. However, the administration of the college might consider presenting the contents of this course to student

who have a higher composite score on the American College Tests and who have a sounder educational and academic background. Apparently, a majority of the students who registered in these four Political Science 10 classes did so because of various institutional requirements. There was apparently not enough incentive for 50 per cent of those registered to complete the course. High attrition is a great waste of time and money. Therefore, a more comprehensive evaluation of students, their needs, desires, interests, and abilities should be studied and implemented.

Areas for Further Study

In any future studies evaluating simulation games and the polarization of attitudes, it is suggested that a semantic differential be devised which would measure not only the dimension of evaluation of concepts, but also potency and activity. These last two dimensions would increase the validity of data in testing the direction and degree of polarization of attitudes.

It is suggested that a larger sample size be used in which it is reasonably assured that the rate of attrition will be lower than 50 per cent. It would also be beneficial to the study if any future sample had a higher mean composite score on the American College Tests or other similar type of standardized measurement.

The finding that simulation games do not affect the

degree of polarization of attitudes is questionable since other studies have indicated the opposite. Future studies should investigate this particular aspect of the problem more closely.

Studies should also be conducted to investigate the possibility of a higher attrition rate among minority ethnic groups. In such a study, the semantic differential could be very effectively used to test for differences in attitudes between white Caucasian and minority ethnic groups.

It is recommended that more comprehensive and supportive means be included in the study design to measure possible degree of motivation resulting from participation in simulation games, and that a reliable and valid instrument be designed to gather data which can be used to determine possible interest in political activities.

Another area for further study could be research using NAPOLI over a longer period of time and incorporating it into class lectures, collateral reading, and the general subject matter of the NAPOLI bills in order to develop more substantial cognitive arguments and rebuttle. As an incentive, for example, speeches could be graded by the instructor for content of cognitive material.

The final suggestion for further study involves a much wider range than this study includes. The concepts of polarization of attitudes can easily be extended to include the movie and television industries, publications, and

advertising. This study, coupled with Heinkel's (1968) pilot study of simulation, could very well be used as a springboard for future research of major proportions concerning the effect of these elements upon the various chronological, educational, and socio-economic strata of our society.

Simulation is a relatively new technique, and research studies as to their worth and merit are embryonic. The areas and depths of simulation have not been plumbed. The influence of simulation in conditioning and forming attitudes, in groups of all ages, in the direction of that which is positive, good, constructive, and desirable is only conjecture at this point in time. Much more research is needed. However, what is true in one direction is also true in another; simulation could influence the formation of attitudes in undesirable directions. Therefore, it is recommended that future studies explore these areas of investigation in order to begin developing authoritative data and proposals concerning the purpose, use, and developmental directions of simulation games.

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Appendix A

Description of NAPOLI

DESCRIPTION OF NAPOLI

NAPOLI provides a fictitious, lower, representative House in which students are members of either one of two political parties, The American Traditionalist Party (ATP) and the American Modernist Party (AMP). The former is the conservative party; the latter, the liberal. These two positions are reflected by the party platforms and the nature of the legislation which the parties sponsor. Each party has representation from eight geographic regions according to a political poll built into the simulation, having conflicting positions regarding the bills under consideration by the House. Supposedly, this poll compensates for the various shades and hues found within the fabric of each party. The student legislator must keep in mind both the interests of his party in general and his region in particular in order to be re-elected to office.

During the game, eleven bills (four sponsored by the ATP, four by the AMP, and three of bi-partisan sponsorship) must be considered and disposed of by the House. The bills are described in Appendix E (taken from the Participant's Manual) concerning content, party sponsorship, pro and con arguments, and regional attitudes.

The simulation allows for restricted blocks of time for party and regional caucuses before each session. Limits are set for each recess and for arguments on each bill under consideration. Following each session, every student is informed of the probability of his being re-elected. The Calculator bases these probabilities on the activity of the House as they relate to the attitudes of the legislator's region and the success in passing legislation of the legislator's party. At the completion of the game, each student is given his probability (mathematically stated) for re-election.

In the opinion of the investigator, NAPOLI does have certain limitations in that it is not an exact replication of our national legislature since it does not include the following:

1. committee structure and activities,
2. bi-cameral influences,
3. executive legislative programs,
4. original or amended bills submitted by legislators,
5. complex voting procedures.

However, according to the Participant's Manual and the Teacher's Guide, NAPOLI does provide for the following:

1. the development and resolution of conflicts,
2. the establishment of coalitions,
3. the development of communications,

4. decision-making activities by students in a classroom where vicarious legislative experiences may supplement other learning concerning the nature, structure, and function of Congress.

According to the NAPOLI Teacher's Guide, the following results may occur:

1. Increased motivation for learning.

2. Increased motivation for inquiry into the model behind the simulation game, i.e., investigation of the system.

3. Learning of skills, such as decision-making, resource allocation, communication, persuasion, influence-resisting.

4. Integration and making more realistic the course material; for example, the interdependence of political, social, interpersonal, cultural, economic, and historical factors.

5. Increased understanding by providing experiences to which students can relate ideas and concepts provided in lectures and texts.

6. Attitudes may be affected.

7. Details of the model behind the simulation game may be learned.

8. Social setting in the classroom can be changed; such as rapport, enjoyment, salesmanship, tolerance, interaction, understanding.

NAPOLI has additional advantages for experimental use in that, first of all, it is one of several simulation games available from the Western Behavioral Science Institute, La Jolla, California. Secondly, personnel from the San Diego City Junior Colleges are willing to assist in the administration of a simulation game for study and

evaluation. Thirdly, NAPOLI does not require any course changes or modifications. Finally, it is hoped that NAPOLI will engender political interaction in the experimental classes since the current trend in the course content of political science courses seems to gravitate toward the identification and analysis of political behavior and attitudes as a means of understanding, developing, and modifying principles of government.

Appendix B

Description of Political Science 10

DESCRIPTION OF POLITICAL SCIENCE 10

According to the 1968-69 San Diego Junior Colleges Catalog (p. 251), Political Science 10 is an introductory course in American Government, with an emphasis on contemporary problems, which deals with the origins, development and problems of the American Federal Government as they relate to state and local governments.

Political Science 10, while meeting the State of California American Institutions requirement for the A.A. Degree, is not intended for students who intend to transfer to a four-year institution. This course is not available to those students who have a stated social science major, or to those who have credits in certain other political science courses.

Appendix C

The Semantic Differential as Used in the Study

The Semantic Differential as Used in the Study

POLITICAL SCIENCE

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

COURSE UNIT

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

ELECTED OFFICIALS

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

REPUBLICAN PARTY

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

DEMOCRATIC PARTY

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

PARTY LOYALTY

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

DECISION-MAKING

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

SIMULATION GAMES

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

RE-ELECTION

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

POLITICAL SPEECHES

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

RESPONSIBILITY

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

ELECTION

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

CONGRESS

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

DEMOCRATIC SYSTEM

INTERESTING	:	:	:	:	:	:	UNINTERESTING
IMPORTANT	:	:	:	:	:	:	UNIMPORTANT
NECESSARY	:	:	:	:	:	:	UNNECESSARY
POSITIVE	:	:	:	:	:	:	NEGATIVE

Appendix D

Questionnaire

QUESTIONNAIRE

Name_____

Date_____

Pol. Sci. 10

Section_____

In the spaces below, please indicate by an "X", the number of hours spent in the following categories during the recent political campaign and election.

	0-5	6-10	11-15	16-20	21-25	26-30	Over 30
1. Watching political programs on TV :	___	___	___	___	___	___	___
2. Reading political articles :	___	___	___	___	___	___	___
3. Discussing politics:	___	___	___	___	___	___	___
4. Working for political parties:	___	___	___	___	___	___	___

Appendix E

NAPOLI Bills

NAPOLI BILLS

BILL NO. 1

Sponsored by the American Traditionalist Party

THE MAXIMUM CORPORATE INCOME TAX RATE SHOULD BE REDUCED FROM 48% TO 40%

Many economists, especially those with a business orientation, believe that the way to get increased economic growth is to provide more resources to corporations. These resources can then be used for investment in new business ventures and for the further development of existing business activities.

It is now proposed that the maximum corporate income tax rate should be reduced from 48% to 40%. This policy, if enacted, presumably will have the effect of providing additional venture capital to business, help restore business confidence, increase the Gross National Product, decrease unemployment and further increase profit after taxes.

BILL NO. 2

Sponsored by the American Modernist Party

THE WORK WEEK SHOULD BE REDUCED FROM 40 HOURS TO 35 HOURS WITHOUT ANY REDUCTION IN WAGES

There has been a long run historical trend towards far shorter hours of work in America. This trend was interrupted around the time of the beginning of the Second World War and has not yet been resumed. It is claimed by a number of labor economists that the failure to reduce hours of work is one of the major reasons why unemployment has continued to rise and, therefore, a cut in hours of work without any reduction in wages would bring about full employment. Other commentators have argued that this would lead to an increase in cost which would not be afforded by the economy--partly because of its international balance of payments problem.

It is proposed to reduce hours of work from 40 to 35 hours over a period of years. Implementation of this policy would depend partly on Federal legislation and partly on union management bargaining.

BILL NO. 3

Bi-Partisan Sponsorship

THE FEDERAL GOVERNMENT, AT A COST OF $8 BILLION, SHOULD INSTITUTE A PROGRAM TO PROVIDE FACILITIES FOR ADEQUATE MEDICAL CARE AND MEDICAL PAYMENTS FOR LOW-INCOME FAMILIES

The provision of facilities for adequate medical care has been a matter of considerable political contention in recent years. With the example of socialized medicine in England and elsewhere, and the increased awareness of the unmet needs for medical attention among low-income families, voices are heard, urging the meeting of these needs through some agency of government having the requisite resources for such a large-scale program.

Those who oppose increased involvement of the Federal Government in this problem fear it may bring about an increased dominance of the individual by the government. In addition, concern is expressed about the degradation of physicians to the role of paid civil servants (with a bureaucratic attitude toward the patients), and the clogging of scarce facilities and services by hypochondriacs, depriving the genuinely ill of proper attention. Moreover, there exists a concern that the added tax burden required to support these provisions will be a threat to economic growth and prosperity.

BILL NO. 3 - continued

Those who are in favor of having the Federal Government make these provisions for medical care and payments argue that low-income families are left only the freedom to sicken and die if their medical needs are not met. It is also argued that hypochondriacs can be detected and turned away; and besides, whatever evil their exploitation of benefits may effect is far overshadowed by the evil of unmet medical needs. It is further argued that the added tax burden will be insignificant if the benefits are provided as an extension of existing social security provisions. Furthermore, additional Federal spending will serve to increase the Gross National Product, reduce unemployment and increase profits to business.

The present proposal would provide direct Federal participation and assistance to communities for the purpose of constructing hospitals and clinics for the use of low-income families. It would also provide the equivalent of low-cost health insurance to such families.

BILL NO. 4

Sponsored by the American Modernist Party

THE FEDERAL GOVERNMENT SHOULD SPEND $11 BILLION TO ELIMINATE EXTREME POVERTY THROUGH DIRECT SUBSIDIES TO THE POOR

There has been increasing concern over the years about the overall problem of poverty and that full employment would not be adequate to solve all the problems of the poverty stricken. There are two major reasons for this. First, a considerable number of poor, old, sick, infirm or otherwise are unable to hold a job. Second, many of the poor are only capable of working in unskilled jobs, and it will be some time before these types of jobs will open in the future to absorb them.

It was estimated in the report of the Council of Economic advisors that it would cost $11 billion annually to provide every family with an income of $3,000. The present policy, if adopted, would insure that every family had an income of at least $3,000. It would involve setting up what has been called a "negative income tax bracket" as proposed by economists Milton Friedman and Robert Theobald. The purpose is simply to insure that each individual or family has an income considered the minimum for adequate living.

BILL NO. 5

Sponsored by the American Traditionalist Party

THE U.S. SHOULD WITHDRAW FROM THE UNITED NATIONS

There has always been an undercurrent of isolationism within the mainstream of American political thinking. Yet, isolationism has never really meant, even to the isolationist, that America should have no interest or involvement in countries and affairs beyond our borders. Witness our continuing interest in China during the 18th and 19th centuries, and our involvement in Latin America, the Philippines, and elsewhere. What isolationism has meant is opposition to "entangling alliances" and arrangements with foreign governments and organizations which would inhibit our ability to "go it alone" and take unilateral action.

The strength of American isolationism during and following the First World War was largely responsible for our failure to join the League of Nations. By the end of the Second World War, isolationism was much weaker, but it was not then and is not now entirely dead. This explains why a small segment of public opinion in this country has been arguing, from the very beginning of the United Nations, that the United States should get out of the United Nations and that the United Nations should get out of the United States. One of the large and influential organizations that has

BILL NO. 5 - continued

taken the position that we leave the U.N. is the Daughters of the American Revolution.

Some people, mistakenly thinking that the U.N. is a world government and not simply an organization of sovereign states, want us to leave because they think that American sovereignty has been infringed and that we are going rapidly down the road towards a single international state. Paradoxically, others are unhappy with the U.N. precisely because it is not a world government and they would like it to be one.

In any case, anti-U.N. feeling is a function of the general world situation. During the Korean War, or during operations like the Congo, demands for our leaving the U.N. increase. During more placid times when the cold war is not getting very hot and Russia seems to be "behaving," much of the pressure for our leaving the U.N. subsides. Barring a drastic reorientation of the world organization toward the Soviet Bloc it appears unlikely that the U.S. will leave the U.N. in the forseeable future.

BILL NO. 6

Sponsored by the American Traditionalist Party

THE U.S. SHOULD ENLARGE ITS PRESENT CIVIL DEFENSE PROGRAM BY $500 MILLION PER YEAR

It would seem that the need for civil defense measures is obvious to common sense in the light of world tensions, and that their increase is mandatory in view of the inadequacy of measures currently instituted. Some people argue, however, that the immense destructiveness of present nuclear weapons makes all civil defense measures inadequate. Even if some people were to survive, they would be in a wasteland where they would envy the dead. Furthermore, the short warning time before attack requires defense measures so rigorous as to completely disrupt normal pattern of life. It is argued further that perennial efforts to expand civil defense programs constitute a misdirection of efforts that might better be directed to the prevention of war. Civil defense programs, it is agreed, tend to give the population a false sense of security.

On the other hand, some people argue that civil defense measures are an essential part of maintaining an effective defense posture. The Western powers rely on a nuclear deterrent force to maintain security, and its effectiveness depends on the extent to which a potential enemy believes that they would dare use this force. If the

BILL NO. 6 - continued

civilian population is not provided with passive protective measures, it becomes less believable that decision-makers would dare use nuclear weapons. It is argued further that, however horrible a wasteland would be left after an all-out nuclear exchange, various rates of recovery can be distinguished, given various degrees of civil defense, and therefore, such measures are reasonable even in nuclear warfare.

The present proposal would provide an additional $500 million per year to the Department of Defense for building and supplying community fallout shelters. It would also provide for training in emergency procedures for the civilian population.

BILL NO. 7

Sponsored by the American Modernist Party

FEDERAL AID TO EDUCATION SHOULD BE INCREASED BY $3.0 BILLION (100%)

The history of civilization has been described as a race between education and chaos. There is increasing agreement that only a very rapid and extensive increase in education will suffice to deal with the problems of automation in a technological age. At a time when machines have on the average the equivalent of a high school diploma (according to the Secretary of Labor), it is clear that people must be provided far more extensive education if they are to find meaningful work and leisure.

It is proposed that Federal aid to education should be increased by 3 billion dollars, i.e., more or less doubled. Such an increase would probably have major implications for the total education budget throughout the country and would encourage increased state and local spending. Funds would be available for such things as new school buildings, laboratories, research facilities, scholarships, teacher salaries, etc.

BILL NO. 8

Bi-Partisan Sponsorship

THE U.S. SHOULD INCREASE ITS SPENDING ON SPACE PROGRAMS BY $2 BILLION PER YEAR

Ever since the Soviet Union launched its Sputnik some 10 years ago, there has been a space race between the two major powers. That race has had purely scientific, military, propaganda and prestige implications. Because of the great cost of space exploration, the race has also had considerable economic, technological and personnel impact. In this country, the National Aeronautics and Space Administration is the agency primarily concerned with space exploration. It employs some 30,000 people, and in recent years has had an annual budget of about $5 billion per year.

In the early days of the race, when there was no question that we were in second place, very little opposition to the cost and rationale of the space program was voiced in this country. However, as the gap between the United States and the Russians narrows--in fact in a number of aspects we have overtaken the Russians--more and more people in the scientific and non-scientific communities have begun to question the American space effort. The political leaders are at best caught in the middle. Most of them know nothing about the technical aspects of space. They do, however, realize the cost and they also understand

BILL NO. 8 - continued

that the space race has prestige implications abroad and economic implications at home. Not the least of these economic implications is the number of people working on the space program and the geographic distribution of the major space installations.

These space debates continue and it is possible that there will be ups and downs in the annual space budgets. A likely prospect is that considerable portions of America's economic, technological and personnel resources will be devoted to this program.

BILL NO. 9

Sponsored by the American Modernist Party

THE FEDERAL GOVERNMENT SHOULD UNDERTAKE
PUBLIC WORKS AND RELATED MEASURES
TOTALING $5 BILLION

According to some observers and economists, many material needs in our society are not being met, primarily because little private incentive exists to deal with them. It is said that needed highways are not built, slums not cleared, and water and sewage facilities not expanded without the direct incentive of government agencies. The present proposal is addressed to the problem of reducing unemployment and "priming the pump" of the national economy. It proposes to do this through the use of a Federal public works program. This program would spend $5 billion of Federal funds in one year on such projects as highway construction, slum clearance, and improved public reservoirs and sewage facilities.

BILL NO. 10

Bi-Partisan Sponsorship

A $75 MILLION DOLLAR APPROPRIATION SHOULD BE MADE TO CENTRALIZE THE OPERATIONS OF THE UNITED STATES DEPARTMENT OF INTERIOR GEOLOGICAL SURVEY IN DAMI

The passage of this bill would provide funds ($75 Million) to build and equip the necessary facilities to centralize the operations of the United States Geological Survey in Dami. Two sites within Dami have been proposed, one in the city of Granda, and one in the city of Canner. Currently the operations of this branch of the Department of Interior are carried out in three rather old facilities located in Agra, Coro, and Inda. The passage of this bill would mean that these older facilities would be largely dismantled, and a major portion of the department's activity there would cease.

Those who favor this bill feel that the Geological Survey is in strong need of modernization, and that its operations should be centralized to enable more efficient and economical operations. The proposed locations are geologically and geographically desirable. In addition, the proposed facility would bring a stable source of jobs to the economically depressed region of Dami.

Those who are against passage of this bill, while

BILL NO. 10 - continued

they agree that this department is in strong need of modernization and expansion, nevertheless feel that it would be cheaper and more desirable to expand the facilities at the present sites. They feel that centralization of this department's operations is not going to increase its efficiency. They feel that it is better to spread the impact of federal goods and services, rather than concentrating them in one location.

BILL NO. 11

Sponsored by the American Traditionalist Party

AT A COST OF $2 BILLION PER YEAR, THE U.S. SHOULD EXPAND ITS PRODUCTION OF LONG-RANGE SUPERSONIC BOMBERS (B-70'S) IN ORDER TO MAINTAIN A CAPABILITY FOR MANNED BOMBER ATTACKS

The policy is tied to the larger conflict between those who advocate an almost completely missile strategic force in this country and those who feel that we must maintain, and indeed expand, our manned bomber attack capability.

On the one hand, the missile advocates argue that missiles are more reliable, they are in many ways cheaper because they do not have to be exercised, overhauled and replaced. They are also less vulnerable in the air than the manned bomber and they generally do not require great numbers of people to fly and maintain them. On the other hand, the manned bomber advocates argue that missiles once released cannot be recalled, that they can't cope with the situations which only men using judgment can handle.

Under the Kennedy and Johnson Administration, the missile advocates seem to have won an ascendency over the manned bomber advocates. But the Kennedy and Johnson Administration has not completely given up manned bombers. In any case, there is a significant move of Senators and Congressmen who have been devoted to the concept of the

BILL NO. 11 - continued

manned bomber and who are only too happy, in conjunction with leaders of the Strategic Air Command, to give their support to any expression of interest in maintaining and expanding our manned bomber capabilities.

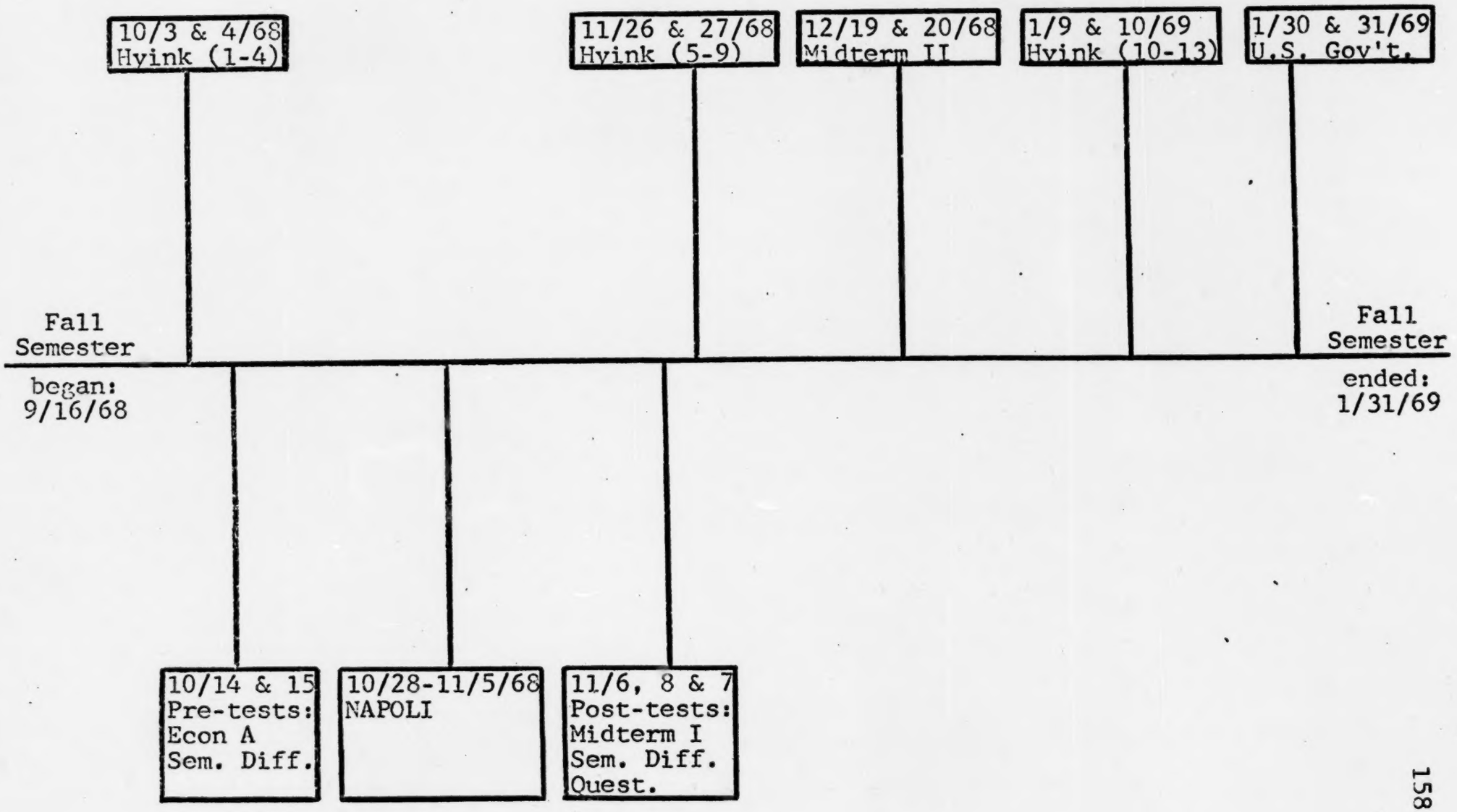
An additional problem in the manned bomber controversy is the difficulty in assessing the reaction of the Soviet Union toward any attempt to increase the manned bomber force. In some respects, because of the position of SAC as the main strategic deterrent to war in the last 15 years, the Soviets may consider increasing emphasis on manned bombers as an especial provocation.

The present proposal would allocate to the Department of Defense an additional $2 billion per year to expand the production of B-70 bombers. This increase in production would be sufficient to compensate for obsolescence of the current operational strategic bomber force.

Appendix F

Time Line

TIME LINE


10/3 & 4/68
Hyink (1-4)
11/26 & 27/68
Hyink (5-9)
12/19 & 20/68
Midterm II
1/9 & 10/69
Hyink (10-13)
1/30 & 31/69
U.S. Gov't.
Fall
Semester
began:
9/16/68
Fall
Semester
ended:
1/31/69
10/14 & 15
Pre-tests:
Econ A
Sem. Diff.
10/28-11/5/68
NAPOLI
11/6, 8 & 7
Post-tests:
Midterm I
Sem. Diff.
Quest.

Appendix G

Analysis of Covariance Tables

IMMEDIATE POST-COGNITIVE TEST: MIDTERM I, FOUR GROUPS

ANALYSIS OF COVARIANCE TABLE

SOURCE	DF	YY	SUM-SQUARES (DUE)	SUM-SQUARES (ABOUT)	DF	MEAN-SQUARE
TREATMENT (BETWEEN)	3	5977.2224				
ERROR (WITHIN)	72	108617.6591	7220.4603	101397.1989	70	1448.5314
TREATMENT + ERROR (TOTAL)	75	114594.8816	8149.9002	106444.9814	73	
DIFFERENCE FOR TESTING ADJUSTED TREATMENT MEANS....				5047.7825	3	1682.5942

DELAYED POST-COGNITIVE TEST: U. S. GOVERNMENT, FOUR GROUPS

ANALYSIS OF COVARIANCE TABLE

SOURCE	DF	YY (DUE)	SUM-SQUARES (ABOUT)	DF	MEAN-SQUARE
TREATMENT (BETWEEN)	3	114.6112	20468.6936	70	292.4099
ERROR (WITHIN)	72	20567.1256	98.4320		
TREATMENT + ERROR (TOTAL)	75	20681.7368	99.5788		
DIFFERENCE FOR TESTING ADJUSTED TREATMENT MEANS			113.4644	3	37.8215

DELAYED POST-COGNITIVE TEST: HYINK 5-9, FOUR GROUPS

ANALYSIS OF COVARIANCE TABLE

SOURCE	DF	YY	SUM-SQUARES (DUE)	SUM-SQUARES (ABOUT)	DF	MEAN-SQUARE
TREATMENT (BETWEEN)	3	12757.4978				
ERROR (WITHIN)	72	367931.9232	11245.3181	356686.6052	70	5095.5229
TREATMENT + ERROR (TOTAL)	75	380689.4211	15062.7173	365626.7038	73	
DIFFERENCE FOR TESTING ADJUSTED TREATMENT MEANS....			8940.0986		3	2980.0329

DELAYED POST-COGNITIVE TEST: MIDTERM II, FOUR GROUPS

ANALYSIS OF COVARIANCE TABLE

SOURCE	DF	YY	SUM-SQUARES (DUE)	SUM-SQUARES (ABOUT)	DF	MEAN-SQUARE
TREATMENT (BETWEEN)	3	1100.1770				
ERROR (WITHIN)	72	42446.7704	2429.5654	40017.2050	70	571.6744
TREATMENT + ERROR (TOTAL)	75	43546.9474	2581.4834	40965.4640	73	
DIFFERENCE FOR TESTING ADJUSTED TREATMENT MEANS....				948.2590	3	316.0863

DELAYED POST-COGNITIVE TEST: HYINK 10-13, FOUR GROUPS

ANALYSIS OF COVARIANCE TABLE

SOURCE	DF	YY	SUM-SQUARES (DUE)	SUM-SQUARES (ABOUT)	DF	MEAN-SQUARE
TREATMENT (BETWEEN)	3	13.6291				
ERROR (WITHIN)	72	9562.4104	52.3601	9510.0503	70	135.8579
TREATMENT + ERROR (TOTAL)	75	9576.0395	37.2188	9538.8207	73	
DIFFERENCE FOR TESTING ADJUSTED TREATMENT MEANS....				28.7704	3	9.5901

DELAYED POST-COGNITIVE TEST: FINAL COURSE GRADE, FOUR GROUPS

ANALYSIS OF COVARIANCE TABLE

SOURCE	DF	YY	SUM-SQUARES (DUE)	SUM-SQUARES (ABOUT)	DF	MEAN-SQUARE
TREATMENT (BETWEEN)	3	.4001				
ERROR (WITHIN)	72	19.2841	.8663	18.4179	70	.2631
TREATMENT + ERROR (TOTAL)	75	19.6842	.9668	18.7174	73	
DIFFERENCE FOR TESTING ADJUSTED TREATMENT MEANS....				.2995	3	.0998